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## SCAR-TISSUE CONJUNCTIVITIS IN ANIMALS—ITS RELATION TO INSECTS AND TRACHOMA.

F. B. EATON, M. D.

SAN FRANCISCO.

This is an account of a disease, hitherto little studied, affecting the conjunctiva in horses, dogs, and other animals probably transmitted by insects and from its resemblance to trachoma offering suggestive analogies with regard to etiology of the latter disease.

Probably few ophthalmologists in this country know that animals, especially horses, cattle and dogs, are subject to a follicular conjunctivitis which, clinically, presents all the essential features of trachoma; i. e., scar-tissue, entropion, trichiasis, pannus, and corneal ulceration and opacity.

On July 1st, 1918, the writer was appointed Acting Assistant Surgeon U. S. Public Health Service and ordered to verify, if possible, trustworthy information to the effect that following the importation of horses, in 1875, from Illinois into the Sierra Valley, California, and from Kentucky into the neighboring Washoe Valley, a severe epidemic of "granular" conjunctivitis with entropion, etc., affected the horses and cattle in those valleys, and that coincidentally a species of biting fly appeared, which bit the caruncle of horses, cattle and old dogs. The information included the statement that up to 1845 the native "broncho" was the only horse on the Pacific Coast, and that no equine eye disease was known in the horse country of the Sierra valleys until the horses were brought in from Illinois and Kentucky.

Pursuant to instructions I went to Loyalton in Sierra Valley, the elevation of which is 5,000 feet, and interviewed horse-dealers and a well-educated and experienced veterinary surgeon. The statement that horses were brought into the valley from Illinois

about 1875 was amply verified; also the species of fly, the appearance of which is peculiar. So far it has not been identified by entomologists; also, its habit of biting men and animals at the inner canthus, but not on the caruncle.

Later I visited the headquarters of the California State Board of Health for information as to where in the State trachoma is prevalent; especially trachoma possibly finding its source within the State. It was found that the only large groups of cases known are those among Indians, Mexicans and Armenians; also, that occasionally a single case is reported from some remote part of the State.

Next, I inspected the remount depot at Camp Fremont near Palo Alto. The ranking veterinary officer in charge informed me that none of the horses came from farther East than Montana; and that in making the eye test for glanders, no conjunctivitis except a transient one had been found among the 3,000 horses. He also stated that he was born and raised in central Illinois, where an equine "granular" (follicular) conjunctivitis is common, especially in August.

When severe, this conjunctivitis is followed, in some cases, by entropion. The people of that region attribute this conjunctivitis to a fly, the life period of which is about six weeks, and which attacks more especially the inner corners (canthi) of the horses' eyes. The



farmers protect the horses' eyes from the flies by leather fringes, etc. In Illinois he had seen cases of scar-tissue of the conjunctiva in horses, always with "granulations," and had seen the same in dogs.

The search for trachoma in localities where there is also granular scar-tissue in animals, in California, was not further pursued, since it is evident that there is comparatively very little of either disease at the present time in the State; and hence there is no opportunity to test the possible connection between the human and animal disease by interinoculation, examination of insects, etc.

My conclusions were:

1. There existed, years ago, in Sierrra Valley and Nevada, a local epidemic of equine and bovine follicular conjunctivitis, with resulting entropion, and corneal opacity.

2. No facts were found satisfactorily establishing connection between that epidemic and the importation of horses from Illinois and Kentucky (tho it is possible), or that the fly described caused the conjunctivitis, either by biting or the transference of the secretion.

3. There are flies, probably species of Tabanidae (horseflies), in California and Illinois, which bite by preference, the eyelids of horses and human beings at the inner canthus. That any fly bites the eyeballs of either men or animals, is unproven.

4. Equine follicular conjunctivitis with scar-tissue and entropion exists in California, but is uncommon. It is more frequently seen in dogs.

5. Equine follicular conjunctivitis with scar-tissue is similar in appearance to that in trachoma, especially in central Illinois in Summer, and there are facts pointing to its origin there from biting flies which bite the eyelids of horses at the inner canthus.

6. Equine conjunctival scar-tissue is similar in appearance to that in trachoma, especially in the last stage, and it is the cause of animal entropion.

7. Single, isolated cases of trachoma, apparently sporadic, occur in California in individuals living in re-

mote places, the origin of which it has not been possible to trace.

8. The prevalence of an equine follicular conjunctivitis with scar-tissue and entropion in Illinois, in view of the well-known prevalence of trachoma in that State, indicates a possible connection between the two diseases.

#### PREVIOUS INVESTIGATIONS AND LITERATURE.

The existence of a source or sources of the trachoma virus in nature, other than contagion from person to person, is, by analogy of other diseases, reasonable; and seems a necessary postulate as regards its ultimate origin. Moreover, the endeavor to discover such a source would naturally precede and lead up to attempts to discover its microscopic character and biology. Scarcely any research has been attempted in this direction, except by the writer as recorded in two papers published in 1910.<sup>1</sup>

The difficulties are great; and the greatest of these are, of course, the insidiousness of the disease, and its contagiousness from person to person. Not only is the victim, and those about him, often unaware that he is afflicted until long after the disease is acquired, but he may have removed far from the environment where it was acquired. Again, if he resides in a locality where the disease is endemic, it is invariably assumed that his is a case of contagion from another victim. Even when a community free from the disease lives in contiguity to one afflicted, the immunity of the former has been ascribed either to non-intercourse of the two, or to a supposed racial immunity. Thus, in 1895, Dr. Foucher<sup>2</sup> of Montreal reported to the French Ophthalmological Society that he and six oculists:

"Have not observed a single case of trachoma among the Indians of Canada, . . . and meanwhile the savages live under conditions favorable otherwise to receptivity; insufficient nourishment, lazy and slovenly, syphilis, tuberculosis and eruptive affections decimate them. It is not the possibility of contagion that is wanting: In Manitoba the Crees and Santeux live side by



side with the Russian Mennonites in the same scorn of hygiene. The Mennonites are ravaged with trachoma and a great many of them are blind from this affection, while the Crees and Santeux remain secure."

For years this immunity was regarded as racial, but the evidence is now overwhelming that there is no racial immunity.

In 1913 Dr. W. H. Harrison, of the U. S. Indian Service, in an article on "The Existence and Prevalence of Trachoma Among the Indians of the Northern United States and Canada," stated:<sup>3</sup>

"I have found but one small band of Indians, numbering 346, wholly free from this malady, and these are a fragment of the great Chippewa tribe scattered along the north shore of Lake Superior. I am unable to account for the absolute immunity enjoyed, . . . when the members of the same tribe, living further inland, are so badly afflicted. The proximity of these people to Lake Superior with its opportunities for cleanliness, will not explain this difference, as all the bands of this tribe live on large lakes, and can, and do, enjoy the same opportunities for keeping clean, as those living along the shore of Lake Superior."

Later, in reply to a query of the writer, Dr. Harrison replied: "I am sure that these Chippewas (on Lake Superior), do not have the number of horses and cattle usually possessed by most Indians, because of the fact that for the past twenty or thirty years they have been engaged largely in the cutting of timber in the surroundings, as laborers for various lumber companies, and in carrying on their previous occupation as fishermen along the lake shore region."

Sulzer,<sup>4</sup> in his report to the French Ophthalmological Society, stated "The more we study the absence of trachoma in Switzerland, the less we comprehend it. Trachoma is not endemic in Switzerland. The Swiss inhabiting countries where trachoma is endemic are subject to acquire the malady. Returning to their native land they recover rapidly. We know of no epi-

demic of trachoma provoked by repatriated trachomatous persons. . . The principal factor in the immunity of Switzerland seems to be the elevation of the country above the level of the sea."

In those regions of the United States where trachoma has been endemic for many years among the native whites, such as southern Illinois, and portions of Kentucky, and West Virginia, we find in southern Illinois and eastern Kentucky, geographic features which, being favorable to certain insect life, seem to have a bearing on the prevalence of the disease in those regions.

A most valuable paper: "On the Prevalence of Trachoma in the State of Illinois," published by Dr. W. H. Wilder<sup>5</sup> in 1901, is suggestive, and was quoted by the writer in 1910. According to Wilder: "In the Illinois Eye and Ear Infirmary, as will be shown, most of the cases come from the rural population, and are of American birth. . . . For years it has been observed at the Infirmary that a great many of these cases come from the southern part of the State, and I have made tables showing the total number of cases from each county for a period of ten years, from 1891 to 1900 inclusive, and from these *have estimated the percentage of trachoma to population* on the basis of the census of 1900. The results are shown on the map, on which the lines (or bars) drawn to scale, represent the relative percentage in the different counties. . . . *It is clearly shown that the disease is much more prevalent in the lower part of the State between the Kaskaskia and Wabash rivers, and is not prevalent around the centers of population.*" (Italics mine.—E.)

In 1910, upon a map of the U. S. Geological Survey of Illinois, the writer added the lines or bars of Wilder's map representing the relative county percentages of trachoma.<sup>6</sup> Referring to this map, it is obvious that trachoma prevails *par excellence* in Clark, Jasper, Cumberland, Crawford, Lawrence, Wabash and White counties, all bordering the west bank of the Wabash river from north to south, and that in all this region there is a multitude of streams. Furthermore, on

reference to the legend of the map, it is seen that in these counties above all others, are many low, sandy, river and creek bottoms; while the central and northern parts of the State, on the contrary, are overlaid with drift, and the elevation is comparatively high.

In the highlands of Eastern Kentucky, where trachoma is believed to be more destructive and malignant than elsewhere in the world, the connection between the disease and the topography is as suggestive as in Southern Illinois; for the mountain inhabitants of Kentucky practically *live only along the beds of the many creeks* which, for instance, feed the middle and north forks of the Kentucky River. The map of the "Buckhorn Quadrangle" (U. S. Geological Survey), comprising parts of Breathitt and Perry counties, Kentucky, shows that in an area of about 186 square miles, except at a few central points, *there is not a single road that is not itself a creek-bed, and that all the homes are on these creek-beds.*

It is approximately the same in Lawrence and Johnson counties, but the feature becomes less in proportion as one goes northwest from the mountains. "These people," according to a brochure of the National Committee for the Prevention of Blindness ("Trachoma a Menace to America," 1915), "live by themselves in little homes, rarely grouped so as to form even a small settlement, and almost completely cut off from the world at large. In the mountains, the creek-beds, which have known no shaping by the hands of men, are almost the only roads."

Now, these topographical features of "Little Egypt" and Eastern Kentucky furnish the typical breeding grounds of various species of the Tabanidae or horse-flies, which, entomologists tell us, breed in the water and wet soil, along and in precisely such sandy creeks and river bottoms. According to entomologists also, the adult Taband is a great water drinker, and can not live far from water, as it requires it for breeding and drinking.

#### VETERINARY LITERATURE.

In veterinary literature, follicular conjunctivitis in animals (horses, cattle and dogs), is a well-recognized disease, as well as its sequelae, scar-tissue, entropion, trichiasis, and corneal opacity and ulceration. By far the most complete descriptions are given by James Law,<sup>7</sup> who states that according to Fröhner 40 per cent of the race of dogs are attacked; and as occurring in horses, cattle and dogs: "It may extend over the sclerotic and palpebrae. Microscopically these swellings are found to be enlarged lymph follicles, with an excess of lymphoid cells. The disease tends to assume a chronic course and may cause entropion and other troublesome lesions. . . . In case they (follicles) prove obstinate, the conjunctiva may be cocaineized and the follicles crushed with ciliary forceps. . . . In extreme cases Fröhner counsels the excision of the membrana nictitans."

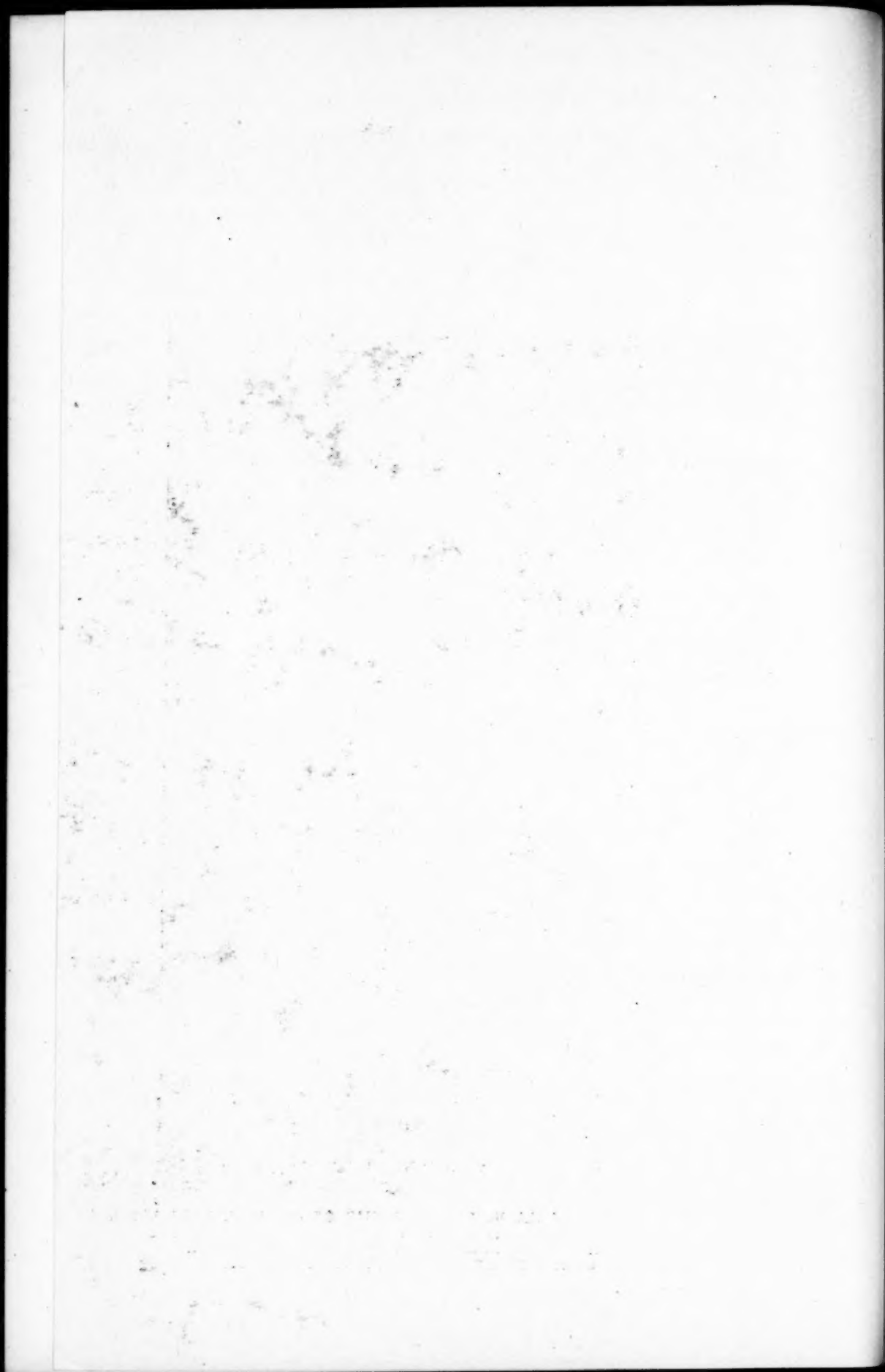
Of entropion: "In the older animals it is largely determined . . . by old-standing disease of the conjunctiva and tarsus, with cicatricial contraction or adhesion. Trichiasis is usually, tho not always, present. In any case, the tarsus is turned inward so as to press upon the front of the bulb, or even to disappear entirely." The treatment, as in human entropion, includes strips of plaster, Gaillard's sutures, and plastic operations. Clinically, the above are pictures of what in human beings is called trachoma and its consequences. Veterinarians do not suspect trachoma, and give the disease other names.

In its last stages in horses, as described by veterinarians to the writer personally, the scar-tissue occupies the characteristic position seen in the human eyelids; i. e., near the edge of the lid and parallel thereto, the line of scar, as it were, forming the hinge of the entropion.

The pathologic identity of this animal scar-tissue conjunctivitis with trachoma can, of course, only be established by comparison of the diseased conjunctiva of men and animals in microscopic sections and stainings; more







especially with plasma stains, by which the infection of follicles by trachoma virus is made certain. (Mayou.)<sup>8</sup>

#### RESUMÉ OF THE SUBJECT.

While it is certain that there exists a scar-tissue conjunctivitis in animals, which, clinically is analogous to trachoma, there are, as yet, no facts establishing a contagion thru the conjunctival discharge from animal to man, or *vice versa*. If it is transmitted, experience with other diseases argues the probability that the transference is thru the medium of a biting fly. The fact that the attempted inoculation of animals (including anthropoid apes), with trachoma virus has been uniformly negative, does not invalidate the possibility of such inoculation, or *vice versa*, thru a biting fly, since the fly in biting, pierces to the capillaries, and hence this form of inoculation is an infection of the tissues, and not a contagion to a mucous surface.

If it could be accepted, the hypothesis that animals and certain species of horseflies (Tabanidae), *when both are present in a region where trachoma and animal scar-tissue conjunctivitis are endemic*, stand in etiologic relation to the human diseases, would harmonize a considerable number of observed facts; facts which, in the writer's opinion, render it at present, the most promising theory on which to base a systematic search for the source in nature, of the disease. The hypothesis, however, at this time rests upon fragments of evidence, which, significant in themselves, are not yet coördinated.

There are yet undetermined facts needed to fully correlate those which are already known. Some are conflicting. For instance, in Switzerland, where trachoma is not endemic and exists only as an imported, contagious disease, there is an abundant fauna of horseflies. On the other hand, according to Abadie, the Bedouin Arabs are free of trachoma in spite of their constant association with horses. Nevertheless, these facts, according to Dr. E. C. Van Dyke, professor of entomology, University of California, an authority on horseflies and a medical man of experience, do not militate against the agency of biting horseflies and horses, *when both are present*, in

producing trachoma. For, as he points out, horseflies cannot exist in the waterless Arabian deserts, while in Switzerland there are comparatively few horses; (144,128 in 1911).

There are many species of horseflies; they are widely distributed, and species occur in all parts of the world, and especially in Southern Illinois and the mountains of Kentucky. Naturally, the species which bite by preference the eyelids of men and animals, are to be suspected; those mentioned in this paper as having this habit, are yet to be identified as to species. To do this requires the cordial coöperation of entomologists.

In stables and barnyards the housefly (*Musca domestica*), outnumbered immensely the biting stable-fly (*Stomoxys*). The ordinary observer does not distinguish between them. Around stables, the houseflies, when they swarm, often dung upon the back of the hands; and this feces may be carelessly carried to the face and eyes. That this might be a source of trachoma seems plausible, especially in view of the now known agency of insect feces in causing typhus, trench fever, etc. But, trachoma is distinctly a rural disease; whereas houseflies also swarm in city stables where horseflies are rare, and in cities trachoma exists only as a contagion from person to person.

In justice to himself, the writer should state that this theory of the agency of animals and biting flies in causing trachoma, was not, primarily, a theory to which he endeavored to find and fit facts. On the contrary, during an extensive ophthalmic practice of nearly thirty years in the Pacific Northwest, he consistently and faithfully recorded the occupation and residence and history of all patients, which he drew from all parts of Oregon, Washington and Idaho. On tabulating the cases of trachoma, the vast majority were found to be farmers, stock men and stablemen; the last predominating. He was unaware that in Hungary stables are popularly held to be a source of trachoma. Later followed the evidence that horseflies attack the eyelids of human beings, especially the eyelids of the trachomatous.

Infections become attenuated in passing for a long period thru many bodies, and it is claimed that especially in Philadelphia, trachoma there "is a most attenuated form of the disease";<sup>9</sup> while on the other hand, in Kentucky, where the disease, if anywhere, originates in some extrahuman source, Dr. J. A. Stucky has testified to its destructive malignancy.

In conclusion, the writer's main purpose in publishing this paper, is to appeal earnestly to his colleagues, especially those resident in regions where trachoma is endemic and prevalent, for coöperation in securing needed facts proving or disproving the theory. It needs besides, a cordial and intelligent coöperation between veterinarians, entomologists, bacteriologists, parasitologists, and the medical profession. As to coöperation, ophthalmologists, collectively, are most ignorant of animal ophthalmology. There has been no co-operation between them and veterinarians.

In seeking to solve the problem of the etiology of trachoma, to restrict investigation to a laboratory search for the microorganism, which, in the weighty opinion of E. Treacher Collins,<sup>10</sup> "is of ultramicroscopic dimensions," while neglecting an equally diligent search for the *source*, is not only illogical, but also contrary to the spirit and experience of preventive medicine.

I have found veterinarians, entomologists, parasitologists, etc., always interested in the investigation, and glad to render assistance by information and suggestion. In this respect the writer gratefully acknowledges the help given by Prof. R. W. Doane, entomologist, and Prof. W. H. Manwaring, bacteriologist, of Stanford University; and also by Profs. E. R. De Ong and E. C. Van Dyke, entomologists, and Profs. Traub and Hayes, veterinary surgeons, of the University of California.

#### CONCLUSIONS.

1. The most promising regions for investigation of the source of trachoma are eastern Kentucky and southern Illinois.

2. In these regions, the relative proportion of animal scar-tissue conjunctivitis to trachoma should be compared with the proportion in regions where trachoma is neither endemic or prevalent.

3. Cordial coöperation between entomologists, veterinarians and physicians is absolutely necessary, in order to determine the agency or non-agency of biting and non-biting flies, their species and habits, in producing animal scar-tissue conjunctivitis and trachoma, and as carriers of these diseases.

4. The pathologic identity or non-identity of the animal conjunctivitis with trachoma should be determined by microscopic sections and plasma staining of the diseased animal conjunctiva, and inoculation of the human conjunctiva with discharge from the diseased conjunctiva of animals. These should, if possible, be made.

6. The normal eyes of individuals bitten by flies (especially *Tabanidae*), in trachomatous localities, should be guarded from contagion and kept under observation to determine whether or not they develop trachoma.

7. Due consideration should be given to the statements of the people living in trachomatous regions as to the origin of trachoma (animals, insects, etc.), and they should be guardedly questioned.

8. The most essential factors in solving the problem are: publicity, energetic field research, and cordial co-operation between medical and scientific experts.

9. Caution is requisite in questioning laymen; their opinions and observations should first be elicited, and leading questions avoided as much as possible.

#### BIBLIOGRAPHY.

1. F. B. Eaton. *Ophthal. Record*, Aug. and Oct., 1910.
2. Étude de géographie ophtalmologique sur le trachôme. Rapport par le Dr. Chibret. *Bulletins et mémoires de la Société Française d'Oph.*, vol. 14, 1896.
3. W. H. Harrison. *Ophthal. Record*, Nov., 1913.



4. Sulzer. *Bulletins et mém. de la Soc. Francaise d'Opht.*, vol. 14.
5. W. H. Wilder. *Ophthal. Record*. Nov., 1901.
6. F. B. Eaton. *Ophthal. Record*. Oct., 1910, p. 514.
7. James Law. *Text-book of Veterinary Med.*, 3d ed., vol. iii, p. 375.
8. James Law. *Text-book of Veterinary Med.*, 3d ed., vol. iii, p. 375.
8. M. S. Mayou, Hunterian Lecture *Lancet*, Mch. 4, 1905, p. 703
9. Samuel Horton Brown. *New York Med. Jour.*, Apl. 1, 1911.
10. E. Treacher Collins, *Amer. Jour. Ophthal.*, July, 1918, p. 504.

## THERMOTHERAPY OF CORNEAL ULCERS.

L. WEEKERS, M. D.

LIEGE, BELGIUM.

This paper, written by Professor Weekers while serving with the Belgian Army and unable to consult the literature of the subject, presents his method of producing sterilization of corneal ulcers and his experimental demonstrations of the possibility of effecting such sterilization without extending the destruction of corneal tissue.

During the war a large number of publications have been added to the literature of ophthalmology in America on the subject of thermotherapy of corneal ulcer. The most notable of these are by Prince,<sup>1</sup> Shahan,<sup>2</sup> John Greene, Jr.,<sup>3</sup> and Young.<sup>4</sup> I have, unfortunately, not had abstracts of any of these papers.

Before the war in different publications<sup>5</sup> I recorded clinical observations and experimental researches on the subject of thermotherapy of corneal ulcers and its prognosis. I simply propose here to review the work done before the war for the readers of the *AMERICAN JOURNAL OF OPHTHALMOLOGY*. In 1910 I published my first observations on the use of the galvanocautery for progressive corneal ulcer when local treatment proved insufficient. Since then thermotherapy has rapidly taken the place of cauterization, especially in Germany,<sup>6</sup> and tends more and more to replace it.

In my former publications I insisted on the principle of this new method of using heat in the treatment of serpent ulcer of the cornea in the following terms:

The cultures of the pneumococci are sterilized in 24 hours at a temperature of 42° C. (108 F.); in ten minutes at 56° C. (138 F.); and instantly at from 65 to 70° C. (149 to 158 F.). In the same way the cultures of the Morax-

Axenfeld bacillus are killed in five minutes at a temperature of 56 C. (131 F.). Without reaching a temperature which kills the microbes immediately can we not with heat destroy their virulence and sterilize the ulcer without, by this method, destroying the corneal tissue? This is the principle of functional sterilization and Pasteurization, and it is used in bacteriology to prepare a culture media with a serum base. A medium rich in albumin cannot stand a temperature of boiling without being notably altered and losing its characteristics. In this method of "chauffage" we replace the rapid action of a high temperature by the prolonged or repeated action of a temperature less elevated.

Heat has been used in the sterilization of wounds<sup>7</sup> and in the treatment of simple chancre for a long time, Aubert being the first to note the excellent effect of prolonged heat on soft chancre; submitting the lesions to a prolonged elevation of temperature maintained during 12 to 18 hours, reaching a maximum of 40° C. (104 F.), resulting in prompt cure. This elevation of temperature seemed manifestly to diminish the virulence and to cause the disappearance of the streptobacilli of Ducrey. Unfortunately this method, difficult of application, is not without danger. In spite of the application of cold compresses to the head the temperature of the patient reached

an elevation of 39.5° C. (103 F.). Therefore there was soon substituted for the above method the simple elevation of local temperature, the heating of the chancroid by local baths of steam and hot air.

One can resort to various processes in making applications of heat to a lesion as superficial and accessible as ulcer of the cornea. In my first attempt ten years ago I had recourse to the galvanocautery, and when the war began I was seeking to find the best application for the electrocautery and bring to perfection this method of "chauffage." The war has completely interrupted my experiments. My plan of procedure was as follows: By means of a rheostat the platinum filament of the cautery was carried to different degrees of incandescence from a dark red to a clear white. I have used an even, moderate heat of incandescence, which is easy to exactly determine, by holding the loop of the cautery during one minute close to the bulb of the thermometer without touching it. The thermometer under this condition registers more than 50° C. (122 F.). This temperature is less than the local temperature of the point heated, because of the extent of the cooling surface as compared with the extent of the surface heated. With a little practice one knows by the color of the platinum wire the degree of incandescence needed to obtain a sufficient heating.

The eye having been previously anesthetized the lids are held open, the cautery is moved slowly over the entire surface of the ulcer, as near it as possible, taking care not to touch the cornea, and paying particular attention to the progressive margin of the ulcer. In general the chauffage of the ulcer is continued for one minute. Under the influence of the heat the moist surface of the ulcer is subject to rapid evaporation, and drying is produced, so that it is convenient to interrupt the process and moisten the cornea with a physiologic salt solution before resuming the application of heat.

At one sitting such an application of heat is repeated two or three times, according to the gravity of the condition.

In my earlier experiences I prolonged the application more than one minute. Further experience has shown that more prolonged and repeated applications are unnecessary. The single application is usually sufficient. It is very exceptional to have to repeat such intervention; and there is little reason to fear further progress of the ulcer.

The clinical results of such thermotherapy are quite favorable. In 1908 in the Eye Clinic at the University of Liège we secured the healing of all cases of progressive ulcer of the cornea by chauffage without cauterization. The efficacy of such heat is remarkable. When the microbes have attained virulence the chauffage cuts short the progress of the serpent ulcer, which cleans itself; and at the same time the hypopyon disappears. The influence of the treatment on the subjective symptoms is very evident. Immediately after chauffage the patient's pain is relieved and the amelioration continues. After cauterization, however, it is not rare to observe violent pain during several hours. For relief of this Vasek\* administers a narcotic (sulfonal and morphin). After chauffage cure is more rapid than after cauterization. The reason for this is that by the former method the damage to the cornea is reduced to a minimum; whereas with cauterization the condition is aggravated. With the anesthesia and heat of the latter the cornea is rendered more opaque, and interferes more with vision. On the other hand chauffage saves the corneal tissue adjacent to the ulcer, making it possible to obtain a better result with the cicatricial cornea from a subsequent iridectomy.

We cannot attach great importance to statistics regarding the effects of thermotherapeutics in this condition, because the functional result in each case varies, not only with the treatment, but also with the site of the ulcer, the stage at which it was seen, etc. Different cases cannot be compared with regard to the efficacy of this treatment. But in spite of these reserves the statistics of the 47 cases of pneumococcus and diplobacillus ulcers that I have published before the

war are very favorable to the continuance of this method. The following are my results with regard to visual acuity:

The chauffage of corneal ulcers is an intervention less violent than cauterization.<sup>9</sup> From this point of view the experiments I have made on animals

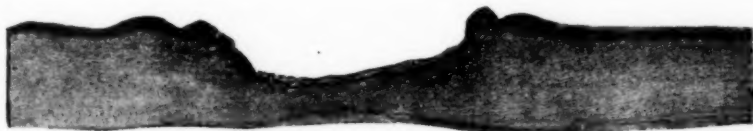


Fig. 1. Effect of cauterizing the cornea for superficial ulcer. Eye immediately enucleated. (Weekers.)

	Cases
Loss of eye .....	0
Good projection .....	1
Hand movements .....	1
Counting fingers .....	15
5/60 .....	13
5/36 .....	10
5/18 .....	4
5/12 .....	2
5/9 .....	1
	—
	47

Vasek published the following table of 66 cases of corneal ulcer treated with cauterization:

	Cases
Loss of eye .....	1
Projection uncertain .....	2
Good projection .....	6
Movements of hand .....	16
Movements of fingers .....	30
5/50 .....	3

are very instructive. Fig. 1 shows the eye of a rabbit enucleated immediately after cauterization of a superficial ulcer. At the point of cauterization is observed complete destruction of the tissue of the cornea, which is considerably thinned at that portion. All parts of the cornea which have been touched by the cautery are destroyed. The cauterization also extends to a certain distance beyond the loss of substance. To this limit the superficial epithelium is altered and necrosed, and the corneal layers become edematous.

This destructive action of the cauterization explains that such intervention in corneal ulcer, which has already reduced the solidity and resistance of the cornea, may produce perforation, or favor it during cicatrization.

Fig. 2 shows a rabbit's cornea cauterized as in Fig. 1, and enucleated ten

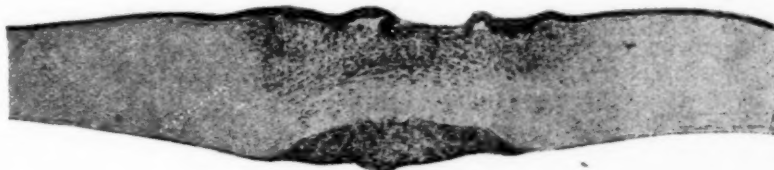


Fig. 2. Effect of cautery applied to superficial ulcer ten days after application.

5/30 .....	5	days later. The cornea shows dense
5/20 .....	1	opacity at the point of cauterization.
5/10 .....	1	In experiments of this kind, as Ran-
5/6 .....	1	vier has shown, the loss of substance is
	—	rapidly replaced, largely by the abun-
	66	dant proliferation of the anterior epi-



thelium of the cornea. Proliferation of the true corneal cells occurs also, causing the subepithelial infiltration reproduced in Fig. 2. Also there is seen immediately under the membrane of Des-

perforation or staphyloma, and the thinned corneal parenchyma remains infiltrated and permanently opaque.

The lesions produced in the cornea by *chauffage*, using a temperature suf-



Fig. 3. Effect of cauterizing the cornea as seen at the end of three months.

cemet a mass of dense cicatricial tissue, due to proliferation of the endothelium of the posterior surface of the cornea, provoked by cauterization. This thickening of the deep cellular layer of the cornea is observed very constantly, tho not always so marked,

ficient to sterilize the ulcer and check its progress, are much more superficial than those provoked by cauterization. Fig. 4 shows the cornea of a rabbit subjected to *chauffage* by means of the galvanocautery for three periods of one minute each at short intervals;



Fig. 4. Immediate effect of applying "chauffage" without cauterization.

and plays an important part in the opacification of the cornea following cauterization.

The thinning and proliferation of the cornea from cauterization as found at the end of three months, are illustrated in Fig. 3. The epithelium of the anterior surface is thickened, and also the

the eye having been enucleated immediately afterward. The lesions are simply an epithelial swelling, and a slight edema of the layers of the corneal parenchyma immediately beneath. In most of the preparations the corneal parenchyma at the point of heating is exposed by loss of the epithelium.



Fig. 5. Effect of "chauffage" three hours after its application.

endothelium of the posterior surface, but the thickness of these layers contributes little to the solidity of the cornea; while the thinning of the corneal parenchyma predisposes to subsequent

The difference between these slight lesions and the destruction caused by cauterization (see Fig. 1), is remarkable. Here no true corneal tissue is destroyed, the parenchyma preserves

completely its thickness and strength. But for this a certain temperature must not be exceeded. When the heating is too intense or too often repeated, as I have noted in numerous experiments, it causes a very profound destruction of the cornea.

Figure 5 shows in a cornea three hours after chauffeage the same conditions as in Fig. 4. The epithelium by proliferation tends to replace the portion lost. The corneal parenchyma is not the seat of any lesion except an edema, sufficiently marked to increase

considerably the thickness of the cornea at this point.

When one heats the cornea of the rabbit, with the technic that I have described for the treatment of corneal ulcers, one observes at the point heated the production of a slight opacity, which thins out slowly and perhaps disappears completely. More often it persists under the form of a faint nebula, which is shown by section to be due to slight thickening of the anterior epithelium and a moderate infiltration of the subjacent layers.



Fig. 6. Ultimate restoration of cornea almost complete after "chauffage." ((Weekers.)

#### BIBLIOGRAPHY.

1. Prince. *Ophthalmic Record*, v. 25, p. 177.
2. Shahan. *Trans. Sec. on Ophthalmology, A. M. A.*, 1917, p. 96.
3. Green, J., Jr. *Southern Med. Jour.*, v. 11, p. 251.
4. Young. *Ophthalmic Record*, v. 26, p. 25.
5. Weekers. *Bull. Soc. d'Ophtalmologie, Belge*, 1910, No. 28, p. 70, and No. 36, p. 52.
6. Wessely. *Archives d'Ophtalmologie*, 1913, p. 300.
7. Aubert. *Paris Thesis*, 1913, p. 29.
8. Vasek. *Zeitschrift für Augenheilkunde*, v. 20, p. 520.
9. Weekers. *Arch. d'Ophtalmologie*, 1913, p. 681.

## BITEMPORAL HEMIANOPSIA DUE TO ACUTE SUPPURATION OF THE POSTERIOR NASAL SINUSES.

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This is the report of a case of this rare form of hemianopsia confirmed by a partial recovery after operation; and a review of current errors regarding the relation of the optic chiasm to the sinuses.

Bitemporal hemianopsia due to sinusitis is, considering the vast amount of literature published in recent years on ocular complications in nasal accessory sinus disease, an extremely rare occurrence.

There are but four such reports in all ophthalmic literature. Hirschman<sup>1</sup> mentions in a discussion that he has seen sinusitis cause bitemporal hemianopsia, while Wallis<sup>2</sup> and Evans<sup>3</sup> have both studied cases which were proven by operative results to be due to disease of the postnasal sinuses.

Levitzky<sup>17</sup> at a meeting in Odessa in 1908 demonstrated a case due to tuberculosis of the sphenoid.

Unilateral temporal hemianopsia due to the same cause has been observed by Gröholm,<sup>4</sup> Evans, Krauss,<sup>5</sup> and Fuchs.<sup>6</sup>

In a collection of 315 cases of bitemporal hemianopsia made by Bogatsch<sup>16</sup> in 1912, but one was considered due to postnasal sinus disease.

### CASE.

2-16-17.—Mr. McG., 26 years old, married, three children, denies venereal infection. Has had what he called the grippe for two weeks; rather severe general headaches for three days; pain worse in morning and increased on moving head or turning eyes to left or to right. Patient says any exertion makes it worse. Some sensitiveness to light for the last 24 hours.

*Ocular Examination.*—Suggestion of swelling in both upper lids. Very slight injection of bulbar conjunctiva and considerable tenderness to pressure on left eyeball. V.—R. 20/30, L. 20/60. Muscular balance normal at a distance and near point. Right fundus normal, left disc slightly hyperemic. Veins somewhat enlarged. Questionable enlargement of blind spots. No central scotoma.

2-17-17.—Headaches still quite severe, especially on getting up in the morning. V. = R. 20/30, —75 sph. = 20/20. L. 20/120 with —1.00 sph. 20/20. Right eye, fundus normal and fields normal. Left eye, disc blurred and swollen with retinal veins much increased in size. With a Peter's compimeter there is a slight enlargement of the blind spot to the temporal side and above. Peripheral field normal for white. Slight contraction of color field. No central scotoma. Pupil slightly dilated and reacts sluggishly to light.

*Rhinologic Examination.*—Septum markedly deviated to the left and touching middle turbinate. Posterior ends of both lower turbinates considerably enlarged, no pus or increased secretion noted on either side. Suction apparatus applied to both nostrils. No pus seen after treatment.

Patient examined by Dr. George Derby, Boston, on February 19th, who reported the following: V. = R. —1.0 sp. = 6/6. L. —1.0 sp. = 2/60. Right eye, field normal. Left, has an absolute central scotoma for white and colors, more marked and larger for green and red than for blue. Affects green over at least 10°. Red 10° below and 5° above fixation. Blue at least 5° below and 3° to 4° above.

One-fourth mm. object on Hartz chart. Right nerve looks slightly fuzzy and vessels somewhat engorged. Looks like beginning slight swelling. Left 2 D. swelling with blurred outlines and large tortuous vessels. An unmistakable optic neuritis. No exophthalmos; but eyes, especially the left, very tender on movement, especially so on pressure. Dr. Derby advised X-ray and thought that nasal operation might be necessary.

Feb. 20th.—X-Ray plates made by Dr. Charles Burgess. No involvement of sinuses shown on plates. V. = R. 15/200.



V. L. Fingers at 6 feet. Right eye, disc swollen and very much blurred. Vessels injected and tortuous and impossible to take field. No color perception in either eye.

Feb. 22, 1917.—V R. = 6/200. L. = fingers at 3 feet. During the following week there was practically no difference in the appearance or vision in either eye, the patient being able to count fingers at only two feet. Operation had been advised but patient preferred treatment for the time being.

Suction, applied to each nostril, was used daily; and a slight amount of pus was seen in the left middle meatus and

make out the front of his bed, which appeared broken off in the middle. He now improved rapidly, so that on March 13th vision was 20/100 in each eye.

On March 20th, 1917, the fields were taken and the patient had a typical bitemporal hemianopsia with the dividing lines running nearly vertical, as will be seen on the chart. Fig. 1.

March 24th, 1917, Dr. Emerson removed a polyp from the region of the right ethmoid.

The fields remained unchanged until March 29th, when there was a noticeable improvement. Field increasing above and below. See figures 2 and 3.

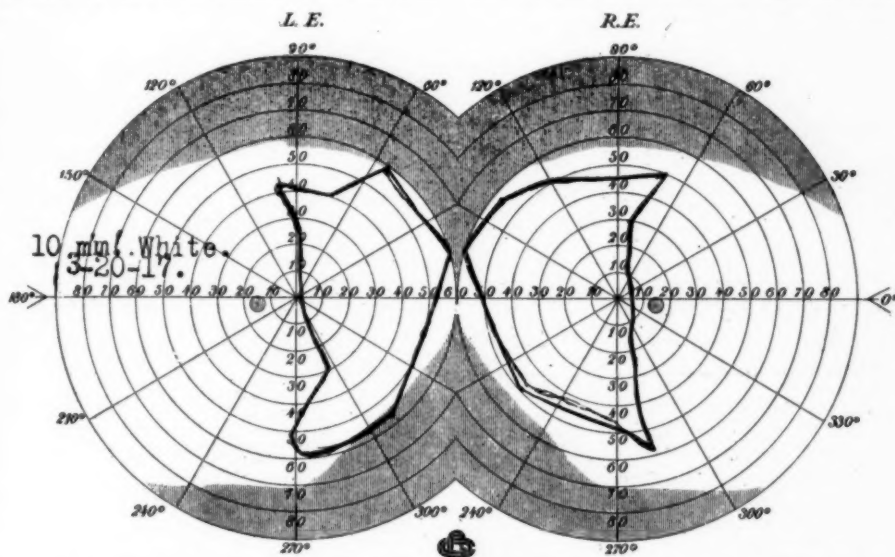


Fig. 1. Typical hemianopsia twenty days after operation upon the sinuses. (Conlon's case.)

could be seen postnasally after a treatment. The pain had now disappeared. Pupils were fully dilated and reacted feebly to intense illumination.

No limitations of ocular movements were at any time noted.

The patient was operated on by Dr. E. P. Emerson of Boston, on the first day of March, who did a submucous resection of the septum and an exenteration of both posterior ethmoids and sphenoids. An acute inflammation was found in both cells on each side.

The day following the operation the patient said he could see a white mist instead of the black one and could just

The next few days the improvement was very rapid, so that on April 2nd the field for white was normal except for a large scotoma in each eye in the region of the blind spot. See figures 4 and 5. Color perception was lost absolutely for the following six or seven months, when there began a slow improvement. Recently the primary colors have been quite readily recognized but there is still a difficulty in matching shades, which has been the source of considerable embarrassment to the patient, who is engaged in the dry goods business.

11-19-18.—V., R. = 20/30—.75 sph. = 20/15. L. 20/60 —1.00 sph. = 20/20.

Both discs are greyish white. The pallor, however, is much more marked on the temporal halves. Fields tested with 5 mm. object show a concentric contraction of the form fields to roughly  $40^\circ$  in all meridians, the color fields showing corresponding narrowing with green within  $5^\circ$  of the fixation point.

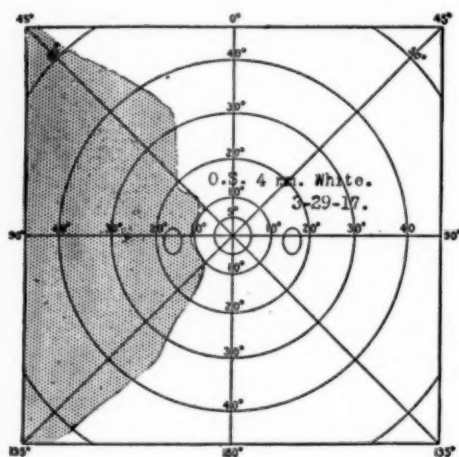


Fig. 2. Field of left eye nine days after Fig. 1.

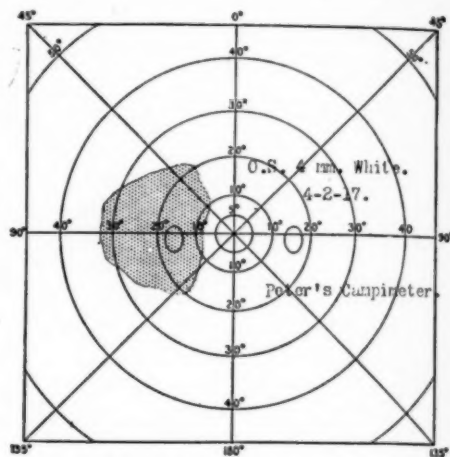


Fig. 4. Field of left eye four days after Fig. 2.

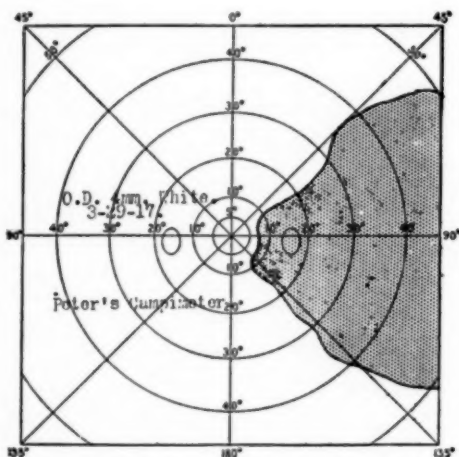


Fig. 3. Field of right eye nine days after Fig. 1.

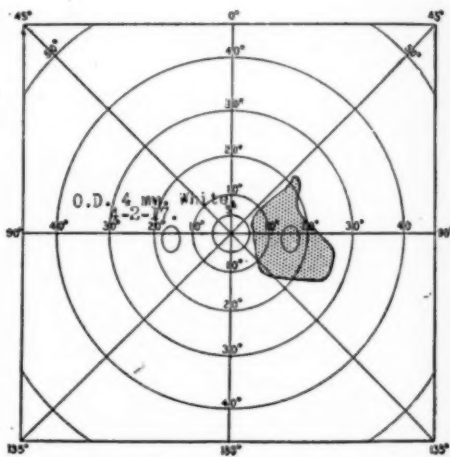


Fig. 5. Field of right eye four days after Fig. 3.

There is still a slight enlargement of the blind spot, each one measuring about  $10^\circ$  in the horizontal diameter.

#### ANATOMY OF PARTS.

When we consider the extreme thinness of the bony wall separating the

sphenoid from the optic canal, 38 per cent of which are extremely thin, measuring at times only  $\frac{1}{4}$  mm., as has been shown by Francis and Gibson<sup>7</sup> in their careful examination of one hundred specimens; the unilateral or bilateral contraction of the temporal fields is quite easily understood as the fibers going to the nasal side of

the retina are in contact with the lateral wall of the sphenoidal sinus while in the optic canal.

Onodi's<sup>8</sup> publications show that it is perfectly possible for a single sphenoid cavity to contain both optic nerves. So may it not be possible, and probable,

that a large number of the cases of neuritis and retrobulbar neuritis said to be due to influenza, measles, scarlet fever, diphtheria, and exposure to cold are due to sinuitis caused by the above mentioned diseases?

A well defined bitemporal hemianopsia, with the dividing lines running vertically thru or near the fixation point, is only to be explained by a lesion of the chiasm. The development of this condition is not so easily explained as it may appear at the first glance.

"The commissure or chiasm rests upon the optic groove of the sphenoid bone, being bounded, above, by the lamina cinerea; behind by the tuber cinereum and on either side by the anterior perforated space."

This expresses the general conception of its position, which is so stated in all the text books I have consulted, and brings to mind a remark frequently made by the late Prof. Dwight, who lectured on anatomy in Harvard Medical School. After the class had very industriously taken notes for twenty or thirty minutes he would suddenly bellow "That's what the books say, but it's not so at all; it's not so at all."

To begin with, the optic groove is not wide enough to hold the optic chiasm. Zander<sup>10</sup> found the groove to measure on an average 6 mm. antero-posteriorly while Lawrence<sup>11</sup> found a well developed one to measure 5 mm., and the chiasm was given by Zander as measuring 8.08 mm. and by Lawrence never less than 7 mm.

In fact the former investigator found no optic groove at all in 66 of the 100 skulls he examined, and never saw the chiasm as far forward as the optic groove, but found it lying from 4.75 mm. to 17 mm. posterior to it. The average distance was 16.34 mm. while

the posterior edge projected on an average of 1.58 mm. behind the dorsum sellae.

Traquair<sup>12-13-14</sup> has repeatedly drawn attention to the true position of the chiasm and says that the usual description is completely imaginary, and not based in actual observation; and that if the chiasm with the apex of the third ventricle be left in situ after removal of the rest of the brain and viewed from above, a wedge-shaped portion of the diaphragma sellae, extending backwards to the extent of a third or a half, or even more of its antero-posterior diameter, will usually be seen in the angle between the optic nerves and frequently also a portion of the foramen diaphragmatis.

Bogoiavlensky<sup>15</sup> operating by the frontal route says that after lifting up the frontal lobe he saw in front of the optic chiasm a tumor occupying the entire space between the optic nerves. This would be manifestly impossible if the usual statement of its position were correct.

Here then is another case where the exception proves the rule, and I have been able to find among the numerous publications of Onodi one plate showing the relationship as it must exist in my case. Loeb<sup>9</sup> has given us another. In both the left sphenoid sinus is seen in close contact with the chiasm and occupying the entire space between the optic nerves.

As we have shown this close relationship of the sphenoid sinus to the optic chiasm to be the rare exception, rather than the usual arrangement, we can now explain the possibility of its occurrence and at the same time understand the comparative immunity of the chiasm to retrobulbar neuritis so commonly associated with postnasal sup-  
puration.

#### BIBLIOGRAPHY.

1. Hirschman. Intern. Centralblatt f. Laryn. u. Rhinol., 1898, vol. 14, p. 389.
2. Wallis, G. F. C. The Practitioner, 1917, XCVIII, p. 41.
3. Evans, J. Jameson. Ophthalmoscope, 1908, VI, p. 235.
4. Grönholm. Zeitsch. f. Augenheilk., 1910, p. 311.
5. Krauss, F. Ophth. Rec., 1910, p. 28.
6. Fuchs, E. Klin. Monatsbl. f. Augenheilk., 1911, p. 110.
7. Francis, L. M. and Gibson, J. A. Ophthalmoscope, 1911, IX, p. 172.

8. Onodi. Arch. f. Laryngol. Rhinol., 1903, XIV, p. 360.
9. Loeb, Hanau W. Operative Surgery of the Nose, Throat, and Ear, 1917, vol. I, p. 48.
10. Zander. Deutsch. med. Woch., 1897, Vereinsbeilage, p. 13.
11. Lawrence. Jour. Anat. and Physiol., Vol. XXX, 1896, p. 49.
12. Traquair, H. M. Brit. Journal of Ophthalm., 1917, Vol. I, p. 216.
13. Idem. Edin. Med. Jl., Sept., 1913
14. Idem. Ophthalmoscope, 1916, XIV, p. 362.
15. Bogoiavlensky. Journ. de Clin., 1912, VIII, p. 409.
16. Bogatsch. Klin. Monatsbl. f. Augenheil., Sept., 1912, p. 313.
17. Levitzky. Klin. Monatsbl. f. Augenheil., 1908, p. 97.

## MONOCULAR RETROBULBAR OPTIC NEURITIS FROM HYPERPLASIA OF THE ETHMOID BONE. REPORT OF THREE CASES WITH OPERATION.

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This paper by review of the pathology of the parts and the report of three cases emphasizes the connection of monocular optic neuritis and ethmoidal disease, and makes a plea for immediate operation in such cases. Read before the American Academy of Ophthalmology and Oto-laryngology, August 6th, 1918.

Hyperplasia is defined as an increase of the fibrous connective tissue elements of living anatomic structures, due to a low grade of localized inflammation. Delafield and Prudden<sup>1</sup> state "it is associated with long continued hyperemia or chronic congestion of the organ involved." Hyperplasia is a non-suppurative process. Skillern<sup>2</sup> has demonstrated by means of many beautiful slides the microscopic difference between hyperplastic and suppurative ethmoiditis, before the American Laryngological, Rhinological and Otolological Society. Beck<sup>3</sup> has also shown slides prepared from hyperplasia of the ethmoid bone.

Welsh<sup>4</sup> noticed "that the connective tissue stroma of an ethmoid specimen was thickened by fibrous tissue production and acute inflammatory products, and that there was thrombosis of many small veins." Shambaugh<sup>5</sup> recognizes the chronic ethmoiditis which is "primarily a nonsuppurative disease, but with impaired drainage of the cells due to hypertrophy of the mucous membrane of the cell walls." He calls the process hypertrophy, but hyperplasia seems to be the better term. Hypertrophy is defined by Delafield and Prudden<sup>6</sup> as "a simple increase

of the *size* of the elementary structures of a part, usually associated with increased function of that part, while hyperplasia is an increase of the *number* of the elementary parts."

Hyperplasia of the ethmoid bone is a rarefying osteitis associated with inflammatory swelling and fibrous thickening of the mucous membrane lining its cavities, causing edematous tissue to fill them without the formation of pus. Its limiting wall (called the capsule), is also thickened and the entire organ is enlarged so that the orbital wall is involved as well as the nasal.

Owing to the fact that the middle turbinated bone is attached to the body of the ethmoid by a very narrow strip, this hyperplasia may be and usually is confined largely or entirely to the structure of the ethmoid proper; and rarely extends across the isthmus of bone to involve the middle turbinate itself. Because of this fact it is usually impossible to diagnose hyperplasia of the ethmoid by simple inspection.

Hyperplasia of the ethmoid bone is of itself a comparatively trivial disease. The nasal symptoms are not particularly distressing, for in spite of the sneezing followed by the watery discharge, transitory impairment of nasal



respiration and the paroxysmal reflex cough, the patient is not greatly annoyed. He may complain of being sensitive to drafts and subject to head colds, and also of being kept awake some at nights by having one side of his nose stopped up, requiring him to turn over on the other side. There is no pain, no purulent discharge and no impairment of the sense of smell.

Owing to the location and structure of the ethmoid bone and the truly remarkable variation in the size and arrangement of its pneumatic spaces, and also the fact that the optic foramen lies in many instances in juxtaposition to its large posterior cell (indeed may traverse it), hyperplastic inflammation may here assume an important role and produce blindness by causing retrobulbar optic neuritis.

The object of this paper is to establish clearly the relation between hyperplasia of the ethmoid bone and acute retrobulbar optic neuritis and to point out the importance of early diagnosis and early operation.

The ocular symptoms of inflammation of that part of the optic nerve which traverses the optic foramen (or what is better termed "the optic canal," for it averages 15 mm. in length), are definite and easily recognized. The patient complains of foggy vision affecting one eye, which rather rapidly becomes worse, so that in a few days he may be entirely blind in the eye. There is usually slight pain on directing his eye to the limit of motion; and a slight pain or uneasiness referred to the temple on that side and back of the eyeball. The one symptom which impels him to seek the ophthalmologist is the very positive and annoying loss of vision affecting one eye and the fear of blindness. There are no nasal symptoms and hence the rhinologist will not be sought.

In the fulminating type of the disease there will appear sudden severe pain, involving all the branches of the fifth nerve, particularly the filaments of the first division; and with it will occur blurred vision which in a few hours progresses to total blindness of the affected eye.

The objective findings which establish the diagnosis are of two kinds, positive and negative.

The positive findings are:

- (a) Monocular blindness.
- (b) Sluggish response of pupil to direct test.
- (c) Dull pain on deep pressure.

(a) Monocular blindness: When there is vision present it is always eccentric. The periphery may still be normal with a very large total scotoma occupying the central area, as shown by the accompanying field charts of my cases. The scotoma is probably relative before it becomes positive; so that if the case appears early enough we would find a partial scotoma for colors in the center, with enlargement of the blind spot. When the patient comes later, as is usually the case, the blind spot is included in the scotoma.

(b) Sluggishly reacting pupil in the affected eye: This slow reaction of the pupil is present to the direct test and not to the indirect or associated tests. The pupils are usually of equal size, because the pathway of the third nerve down from the sphincter nucleus of the brain to the iris is not involved, and the light impulse in the unaffected eye causes an equal efferent response in both pupils. The pupillomotor fibers of the optic nerve in the affected eye are inhibited in function by the disease present in the optic nerve at the apex of the orbit; and hence tardily convey the light impulse upward to the brain, or not at all, as the case may be.

(c) Slight tenderness referred to the apex of the orbit when making pressure against the eyeball thru the closed eyelids: This symptom is not always present.

The negative findings are quite important for they assist greatly in establishing a diagnosis. They must be studied in relation to the positive. They are:

- (a) Normal disc and fundus.
- (b) Normal middle turbinate.
- (a) Normal appearing optic disc and fundus in the eye affected with central scotoma or blindness is very characteristic of this disease. Later on, usually

after a month following the onset of the trouble, there will appear beginning atrophy of the optic disk. This atrophy progresses in proportion to the severity of the retrobulbar neuritis that preceded it and may be complete. Usually it is partial. A careful study of its extent will reveal that it involves the temporal side of the disc representing a wedge or a sector of from one-fourth to two-thirds of that side of the disc; and is a white atrophy with clearly cut disc margin; in other words, a typical primary descending atrophy. A small sector of the disc on the nasal side may still retain a degree of pinkness.

(b) Normal appearing middle turbinate body with no discharge present in the nose: The turbinate is usually not visibly enlarged nor is it discolored. It is not usually impacted against the septum, and there appears ample breathing space and normal nasal function. If, however, the body of the middle turbinate be shrunken, with cocaine and adrenalin, one may find the evidence of hyperplasia of the ethmoid proper by observing small polypi hidden under it.

The differential diagnosis includes toxic amblyopia, congenital amblyopia, malingering, hysterical blindness of one eye, monocular optic neuritis from systemic infections and monocular blindness from fracture at the base.

In toxic amblyopia the history of inordinate use of alcohol and tobacco is usually easily determined or the taking of wood alcohol, large doses of quinin, etc., is admitted. Toxic amblyopia is much slower in its course than amblyopia due to ethmoid disease; moreover it is almost invariably expressed in both eyes, altho with different degrees of severity.

In congenital amblyopia affecting one eye the differential diagnosis is easily made, if the patient has been aware of affected vision in one eye for a long period of time. Occasionally such patients discover the amblyopia by accident only a short time before consulting the ophthalmologist, or the latter may discover it for the first time during the process of examination of

the patient's sight. The cases of congenital amblyopia will show no central scotoma even by use of the 3 mm. disc. His fields of vision for white and colors will be normal in periphery and center. Congenital amblyopia is stationary and presents no sign of atrophy at any time, while the disease under discussion is never stationary and the disc eventually shows distinct atrophy.

Malingering blindness of one eye will be discovered by an astute ophthalmologist who knows how to conduct the proper tests and uses them.

Hysterical blindness in one eye is either partial or complete; if partial the field of vision is usually typically contracted with no evidence of central scotoma. If total the tests applied for detection of malingering blindness will suffice.

Monocular optic neuritis from system infection or disease, is diagnosed by the absence of central scotoma and the history of such infection, e. g., measles, typhoid fever, scarlet fever, etc. In some cases the optic neuritis and neuroretinitis are discovered to be due to albuminuria or diabetes, which may produce the same picture as infections. The optic neuritis due to local infections from showers of germs thrown into the circulation from a suppurative focus in the body as from diseased tonsils, diseased bone as at the apices of the teeth, etc., is differentiated also by the absence of central scotoma or rapidly progressing blindness and by the presence of a frank neuroretinitis.

It is sometimes difficult to locate the origin of these infections. One of the cases reported in this paper had an acute empyema of the ethmoid cells which produced no nasal symptoms worthy of note and which was discovered at the time of the operation. An able X-rayist must be engaged to make careful plates and submit them along with his interpretation. Other types of optic neuritis such as occur in brain tumor with increased cerebral pressure or from pituitary disease or meningitis, etc., need not be dwelt on here.

The type of optic nerve lesion which most nearly simulates that due to hyperplasia of the ethmoid is the trau-

matic, where there was a fracture of the base involving the bony structure at or near the apex of the orbit. I have seen recently a case where the X-ray showed a line of fracture involving the roof of the orbit running back to the bony apex, due to a fall into an excavated pit, the patient striking the right temple on a block of cement. There was total blindness of the right eye. Normal optic disc and retina were observed ten days after the accident. Signs of atrophy appeared on the twenty-first day and total atrophy on the twenty-eighth day, the eye remaining blind. In this case there was not the slightest sign of optic neuritis as seen with the ophthalmoscope. The atrophy was descending and primary, evidently due to compression from hemorrhage or swelling at the optic foramen, and was, practically speaking, the same kind of atrophy as seen in two of my cases due to hyperplasia of the ethmoid bone, which are reported in this paper later on.

Since hyperplasia of the ethmoid bone is a very common affection why is it that retrobulbar optic neuritis and consequent monocular blindness are so infrequent? The answer must be found in the aberrant anatomic arrangement of the posterior ethmoid cells, in relation to the optic nerve in the affected cases and not in others. Loeb and others have shown by wet specimens that the optic canal occasionally lies so close to the posterior ethmoid cells as to have a common wall between them; and that, too, of the thinness of paper. Indeed the optic nerve may traverse the posterior ethmoid cell and lie free in it for the distance of 12 to 15 mm.

The posterior ethmoid cavity of one side may be so large as to extend across to the opposite side and lie in relation to both optic nerves, which is also true of one of the sphenoid cells in other cases. The posterior cavity of the ethmoid is found more frequently in relation to the optic canal than is the sphenoid, altho it is true that the sphenoid and not the posterior ethmoid may lie next to the optic canal. Nature has not only created widely differing cell arrangements in the nasal architec-

ture of different individuals but has jumbled the arrangement in the two sides of the same individual.

In case of periostitis, traumatism, hemorrhage or swelling of the walls of the optic canal, there is no provision of nature to guard the optic nerve against compression and strangulation. The optic nerve extends beyond the optic foramen within the skull cavity for a distance of 15 mm. before it reaches the chiasm, so that the compression of the nerve in its foramen does not affect the chiasm and the clinical manifestations are monocular.

The fibers which supply the macula lutea of the retina lie in the center of the optic nerve at the foramen; but as the eyeball is approached from behind they are seen to shift gradually toward the temple side, so that where the disc is seen with the ophthalmoscope they occupy the wedged shaped temple fourth or third, and the artery and vein are at the center.

Why is it that the ophthalmoscopic examination is negative in the active stage of this disease? The answer is that the central artery of the retina and its vein only exist in the nerve for a distance of 15 mm. behind the eyeball. Beyond that they lie outside the sheath of the nerve. The transverse optic neuritis and compression exists nearly an inch further back and the retinal circulation is not impeded by it. Within thirty days after the disease announces itself atrophy of the disc is seen and it appears as a primary atrophy.

Why is central scotoma an early sign of the disease?

The papillo-macular fibers of the optic nerve are the finest, most highly specialized and most vulnerable. Swelling of the bony wall of the optic foramen causes as much pressure in the center of the nerve contained therein as at the periphery; this according to the well-known law of physics and the first to suffer are these delicate fibers supplying the macular region of the retina. It is not inconsistent with the theory of compression to have interstitial neuritis as described by Collins and Mayou, intraneural exudation, perineuritis, varicosity of the axis cyl-

inders, fatty degeneration of the nerve cells, capillary thrombosis, etc.; but I take it that these phenomena are secondary to the strangulation and are natural in pathologic sequence. They follow after the compression and in turn are followed by the atrophy. The point I wish to emphasize is that infection of the nerve is not necessary to produce optic neuritis within the optic canal. Mechanical pressure is sufficient. It is undeniable, however, that in certain cases the optic nerve may share in the localized inflammation because of mere identity of its bony collar with the ethmoid wall.

Arnold Knapp<sup>7</sup> recognizes the types

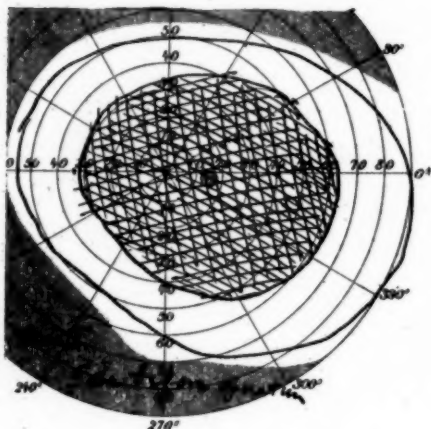


Fig. 1. Central scotoma in Case I. (Vail.)

of cases reported in this paper, stating there is retrobulbar optic neuritis in which central scotoma is the characteristic functional defect. He further states,<sup>8</sup> "Optic neuritis of nasal origin occurs in two forms: One during the course of suppurative sinusitis, the other where there is a typical retrobulbar neuritis and the rhinoscopic examination is negative. In the latter cases exploratory operation reveals a latent infection. The more acute the case the more rapid the loss of vision and the better the prognosis. The effect of the nasal operation is remarkable. The nasal diagnosis in these acute cases is often difficult; even with negative rhinoscopic findings an exploratory operation must frequently be undertaken."

Since my paper on "Optic Neuritis from Intranasal Disease," read before this society in 1901, I have seen many cases illustrating the relation between ethmoiditis and acute retrobulbar neuritis but I shall report three typical cases that came under my observation within three weeks of each other. All three were operated on at once in spite of the fact that in each of them the ethmoid appeared normal as viewed rhinoscopically.

#### CASES.

Case I.—L. W. E., male, age 35, occupation telegraph operator.

March 14, 1917.—*History*—Twelve

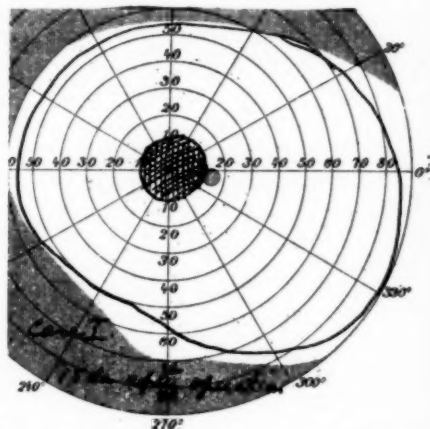


Fig. 2. Field in Case I two weeks after operation on the ethmoid.

days ago, while working in his office, he noticed foggy vision in his right eye. No pain was felt at any time. No history of trauma. Patient noticed deterioration of vision from day to day. Is a total abstainer from alcohol, tobacco and coffee. Denies syphilis. No nasal symptoms.

*Examination*—Eyes: External inspection and tension normal right and left. Pupils 3 mm. right and left. Right pupil responds feebly to direct test and readily to indirect. The left pupil reacts quickly to direct tests and not at all to indirect. Ocular motility unaffected. Vision: Right eye cannot count fingers. Left eye vision 20/20 corrected and reads Ja. 1. Field of vision R. E.: periphery nearly normal; there is a large central scotoma extending approximately 40° in



all directions from the center. (See Fig. 1.)

Examination of eyes under homatropin: Pupils dilate equally and *ad maxi-*

Diagnosis: Monocular blindness from nonsuppurative ethmoidal disease on the right side.

Operation: March 19, 1917. The

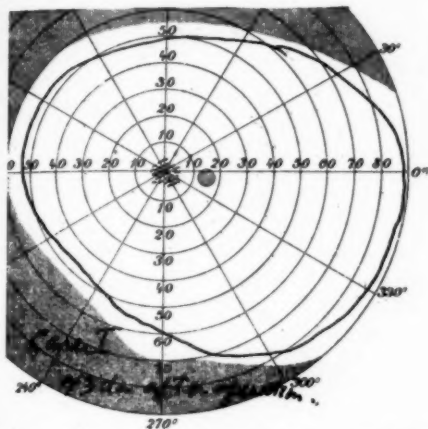


Fig. 3. Field of vision in Case I one month after Fig. 2.

*mum*, dioptric media clear. Fundus in each eye appears entirely normal in every regard and no difference noted by comparing the optic discs.

Nose: Inspection negative. Turbinate bodies appear unaffected, breathing space normal, no discharge

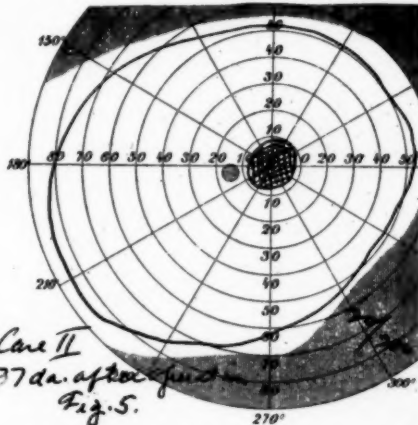


Fig. 5. Field of vision in Case II thirty-seven days after operation.

right ethmoidal labyrinth was exenterated by Mosher's technic. Twenty-four hours after operation patient stated his vision was improved.

April 3; vision was 20/50 and central scotoma does not extend over 10°, from fixation point. (See Fig. 2.)

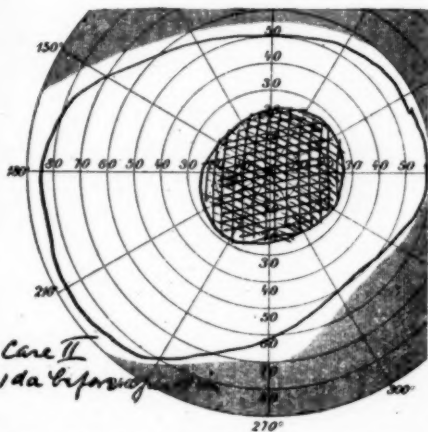


Fig. 4. Field showing central scotoma in Case II, one day before operation.

present and no difference noted between the two nasal chambers.

Report of Radiographer (Dr. Lange): "Frontals and antra clear. Oblique exposure of the ethmoid shows distinct clouding of posterior ethmoid cells on the right side. Sella turcica normal."

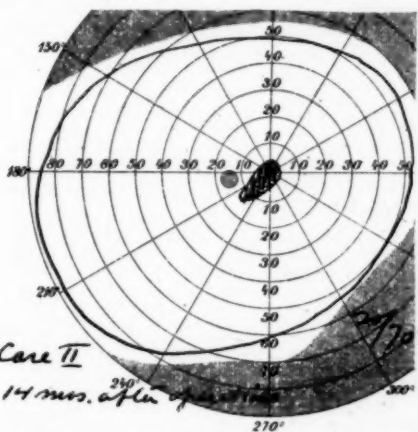


Fig. 6. Field of vision in Case II fourteen months after operation.

April 17; vision 20/30.

May 1; vision 20/30. Central scotoma is relative now and there are signs of slight atrophy on the temple side of the disc. (See Fig. 3.)

May 29, 1918 (one year later); vision 20/20 and reads Ja. No. 1. Oph-

thalmoscope reveals distinct pallor of the disc especially involving the temple side. Right disc is nearly white, left is quite rosy. In spite of the atrophy the vision is 20/20 and Ja. No. 1, and the fields of vision are entirely normal for white and colors. There was never any discharge from the nose after the operation and the operated field is clean and normal appearing.

Case II.—Miss V. M. Age 18—Occupation school teacher.

March 20, 1917.—*History*—Two weeks ago had a mild attack of "pink-eye" and "cold in the head." There was some pain in the left eyeball whenever she directed the eyes to extreme field of fixation. This pain still persists. Five

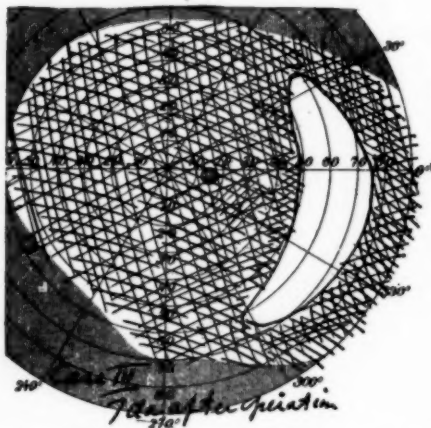


Fig. 7. Field of vision in Case III one week after operation.

days ago the vision of the left eye became dim.

*Examination*—Eyes: Right eye appears normal, pupil  $2\frac{1}{2}$  mm. and responds to direct test. Vision in this eye is 20/20 and Ja. No. 1. Field of vision for white and color normal right eye. The ophthalmoscopic examination reveals normal disk and fundus.

Left eye: Orbital tenderness on deep pressure against the eyeball. Pupil  $2\frac{1}{2}$  mm. and sluggish in reaction. Tension normal, ophthalmoscopic examination reveals a distinctly swollen optic disc. Veins are swollen and tortuous. Details of fundus quite hazy, due to presence of neuro-retinitis. Vision barely 20/200.

Field of vision at periphery normal, but there is a large absolute central scotoma present. (See Fig. 4.)

Nose: Ample breathing space. Turbinated bodies appear normal and alike on the two sides. No secretion present.

Report of Radiographer (Dr. Lange): "Frontals and antra clear. The left ethmoid taken by oblique exposure shows distinct cloudiness. The right appears normal."

Diagnosis: Left optic neuritis from ethmoid disease.

Operation: March 21 a complete extirpation of the left ethmoid and sphenoid was done under cocaine anesthesia. Cells contained pus.

March 24; the left optic disc appears less swollen.

April 7; can barely see 20/200. There are signs of beginning atrophy of the disc.

April 27; the left optic neuritis has subsided and atrophy is becoming established. Still has absolute central scotoma, tho not so large as at first noted. (See Fig. 5.) Vision now 20/200.

June 22; partial atrophy of the optic nerve especially noted on the temple side of the disc. Vision 20/100. Nose appears free from discharge now. The day following nasal operation there was quite a flow of creamy pus from the sphenoid and ethmoid region.

May 18, 1918 (14 months after); the right optic disc is normal and vision is 20/20 and Ja. 1. The left disc is uniformly pale. Small central scotoma (see Fig. 6). Vision 20/70. Nose free from discharge and appears healthy.

*Comment*.—This was undoubtedly a case of optic neuritis from ethmoid disease, as there was a suppurative process at work in the post-ethmoidal and sphenoidal cells. The rhinoscopic examination before operation could not detect the suppuration. It was revealed by the operation.

Case III.—Miss M. S. Age 60. No occupation.

May 4, 1917.—*History*—Without previous warning and from unknown cause the right eye suddenly became blind three weeks ago. The only other sensation was

that of a dull pain in the right temple and brow. The blindness of the R. E. is complete as there is no l. p.

**Examination.**—Eyes: External inspection negative. Pupils nearly equal in size. (R. 4 mm., L. 3.5 mm.) The right does not respond to light but it does respond consensually and associately. Eyes appear straight and motility is normal.

**Ophthalmoscopic examination is entirely negative right and left.** Vision, right, nil, left 20/20 corrected, tension normal in each eye, field of vision left eye normal for white and colors.

**Nose:** Nasal chambers appear entirely normal. No history of chronic nasal disease.

The nose appears normal, no purulent discharge was present at any time before or since operation.

**Vision:** Can count fingers at 10 feet by eccentric fixation.

#### CONCLUSIONS.

The cases reported illustrate two types of monocular optic neuritis from ethmoidal disease. In the one type illustrated in Case No. II there was a frank exudative neuroretinitis, associated with functional blindness in the center of the visual field due to a suppurative process at work in the posterior accessory sinuses of the nose that lie in proximity to the optic nerve. The exudation was

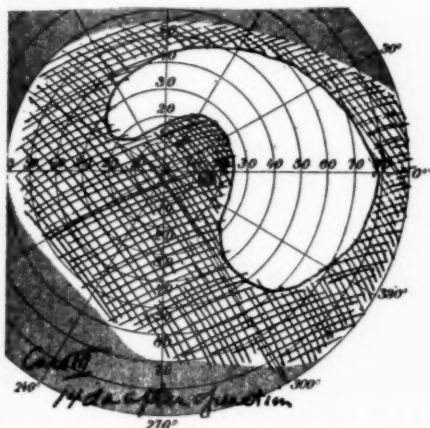


Fig. 8. Field of vision in Case III two weeks after operation.

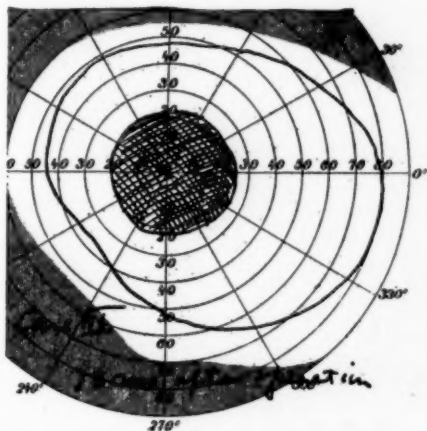


Fig. 9. Field of vision in Case III thirteen months after operation.

**Diagnosis:** Monocular blindness from concealed ethmoid disease.

**Operation:** May 4, 1917. Exenteration of ethmoidal labyrinth and opening of sphenoidal cell on the right side.

May 11; there is a slight response of pupil to light, and detects hand movements in extreme temple field. (See Fig. 7.)

May 18; can count fingers eccentrically. Still has central scotoma. (See Fig. 8.)

June 15, 1918 (thirteen months after); optic disc atrophied on the temple side. There is still an absolute central scotoma present as shown on accompanying chart (see Fig. 9), but the peripheral field is restored. Pupils are normal in size and the right now responds readily to light.

doubtlessly due to bacterial influences and the central scotoma to the swelling of the nerve (interstitial neuritis), within the bony optic canal.

In the other type illustrated in Cases No. I and III there was no bacterial invasion of the nerve present, but there was swelling of the orbital wall of the posterior ethmoidal or sphenoidal cell which pressed the optic nerve in its passage through the optic foramen and caused a strangulation of the nerve at this point. This compression no doubt produces a transverse optic neuritis which, while not due to bacterial invasion is nevertheless destructive to vision, and is followed by more or less permanent atrophy of the optic nerve. The nasal disease that produces this phenom-

enon is a nonsuppurative one, hyperplasia of the ethmoid bone.

*The disease should be recognized and operation on the ethmoid performed at once in spite of its being normal in appearance. The diagnosis is made solely from ocular findings.*

The plea I would finally make is *operate at once*. The prognosis is good as to restoration of vision if the operation is performed during the acute stage, but if delayed until atrophy sets in the prognosis is bad.

#### BIBLIOGRAPHY.

Since writing this paper Greenfield Sluder's book on *Headaches and Eye Disorders of Nasal Origin* (June, 1918, C. V. Mosby Co., St. Louis), has been published and we note many strikingly similar arguments to sustain the proposition that hyperplasia of the sphenoid and ethmoid bones causes visual and other disturbances from compression of the trunks of the anterior group of cranial nerves at the foramina of exit.

My paper was written without knowledge of Sluder's work in the same field, which accounts for lack of reference to his masterful production. His book covers a much wider range and, written by a rhinologist of renown, will receive and merit the highest commendation.

1. Delafield and Prudden. *Pathology Text-book*, p. 121.
2. Skillern. *Trans. Amer. Laryngol., Rhinol. and Oto. Soc.*, 1910, p. 198.
3. Beck. *Ibid.*, 1913.
4. Welsh. *Ibid.*, 1917.
5. Shambaugh. *Ibid.*, 1914, pp. 228-229.
6. Delafield and Prudden. *Pathology Text-book*, p. 93.
7. Knapp. *Medical Ophthalmology*, p. 379.
8. Knapp. *Ibid.*, p. 382.
9. Vail. *Amer. Jour. Ophth.*, 1901, p. 138.

### DISEASES OF THE UVEAL TRACT.

SAMUEL D. RISLEY, M. D.

PHILADELPHIA.

This paper gives a general review of certain important pathologic conditions affecting the uveal tract, especially tuberculosis and eyestrain; and of vascular changes that result from uveal lesions, notably myopia, glaucoma and cataract. Presented at the meeting of the special section of the Pennsylvania State Medical Society, Sept. 5th, 1918.

I have chosen among many possible topics for presentation in our special field of research, the diseases of the uveal tract and will discuss these disorders from the standpoint of etiology and their sequelae. No subject in ophthalmology could have been chosen which presents more features of dramatic interest or practical importance to every medical man. First of all, to epitomize my thesis, I need not remind you that the uveal tract of the eye is developed embryonically from the ectoderm and mesoderm, and therefore is liable to participation in all of the systemic maladies which affect these tissues elsewhere in the organism; and, because of the anatomic conditions peculiar to the eye and their relation to the physiology of vision lead to a wide group of sequelae which seriously

threaten to impair function. In the time I can reasonably take in presenting the subject, it will be impossible to trace the extended literature and I will, therefore, make only such reference as may be needed to emphasize my own conclusions based upon personal study.

My first appreciation of the signal importance of the uveal tract to comfortable physiologic vision was gained very early in my professional experience thru the careful clinical study of a large series of cases of recurrent iritis, the results being set forth in a paper entitled, "Iritis—A Clinical Study,"<sup>1</sup> presented to the Pennsylvania State Medical Society in 1877, and with greater elaboration in 1884 in a second paper entitled, "Recurrent Iritis."<sup>2</sup> About the same time the observations



were being made which led up to the examination of the school children's eyes in Philadelphia,<sup>3</sup> which was primarily an investigation to discover the genesis of the myopic eye. It soon became obvious that in iritis the inflammation did not involve the iris only, but the entire uveal tract; and that the distension or enlargement of the globe in myopia was not, as had been claimed a physiologic growth; or an adaptation of the eye to the requirements of civilized life, as had also been claimed; but was always associated with quite characteristic pathologic processes involving the uvea, especially the choroidal and ciliary regions of that membrane. In a word, myopia was a sequel to the uveal disease.

Incidentally, it was demonstrated by that investigation that the children having emmetropic eyes passed thru their school life with a minimum of pain and disease while the eye strain consequent upon congenital abnormalities of refraction and ocular imbalance resulted in pathologic states involving the uveal tract; were invariably associated with pain, and lowered sharpness of vision. This was especially true where hyperopic astigmatism was present; and that the percentage of these eyes steadily diminished as the age of the pupils advanced while the percentage of myopic eyes increased in a corresponding ratio. Briefly stated, the myopic eyes were recruited from the hyperopic eyes thru the turnstile of astigmatism and always thru the agency of the pathologic states of the uvea produced by eye strain. This conclusion was fortified by the publication of a series of private patients in which this change of refraction was observed during its progress under the most careful scrutiny.<sup>4</sup>

Then, too, I have had the opportunity to observe a hyperopia of 2 D. converted into a myopic refraction after a prolonged attack of severe iridochoroiditis where adhesions of the iris to the lens capsule had been prevented by treatment, and the lens remained clear. The myopia was therefore due to axial increase. The patient was a man aged forty-five with a marked ten-

dency to rheumatoid arthritis. The iridochoroiditis was a distressingly painful experience and a tendency to increased tension of the globe had constantly to be combatted, the violent attacks of pain being relieved only by instillations of eserine. It is my frequent practice to use weak solutions of eserine salicylate at intervals between the instillation of atropine in the treatment of all uveal affections.

At first thought, the progressive myopia of youth and the glaucomatous eye of after middle life, are as far apart as the poles. But careful consideration will show that the relatively tender sclerotic of youth distends under the undue intraocular tension produced by the congested and inflamed vascular choroid and ciliary body in the presence of eye strain or disease and the diameters of the eyeball increase. In a word, it becomes myopic. On the other hand, the tough unyielding sclerotic of middle life in the presence of uveal disease, presents the painful and destructive syndrome of increased tension of the globe. In such a view we at once grasp the dramatic significance of disease of this vascular membrane in the life history of the eye. Composed as it is of a meshwork of connective tissue, pigment epithelium and blood vessels with their accompanying lymph spaces, it is the nourishing coat of the eye.

The well being, therefore, of all the other tissues is either wholly or in a large measure dependent upon the normal or healthful performance of its important function. Not only is this true of the different parts of the uveal tract itself, but it is peculiarly true of the avascular structures of the eye; the vitreous body; the crystalline lens; and the cornea. I know of no more important or inspiring study to the thoughtful ophthalmic surgeon than the careful perusal of one or more of the later books devoted to the investigation by modern laboratory methods, of the anatomy and histology of the human eye. The studies of the histologic anatomy of the ciliary body and ciliary processes and their relation to the zone of Zinn, the suspensory ligament, the

anterior limiting membrane of the vitreous body, the scleral ring and root of the iris are especially important if one is to have a correct concept of the processes of disease of the uveal tract, or for the adoption of scientific procedures in their treatment.

The zone of Zinn, and the suspensory ligament of the lens are not to be regarded as impervious, glass like membranes, but as finely fibrillated structures and therefore pervious to the nutritive fluids from the choroid and ciliary region of the uvea designed as they pass forward not only for the nourishment of the vitreous, lens and cornea, but into the anterior chamber for exit into the canal of Schlemm and the lymph spaces of the conjunctiva. From this anatomic and histologic arrangement it is obvious that any disturbance of these delicate and highly organized structures by disease of the uvea must be of signal importance as a disturbing factor in the nutrition of the eye. Then, too, it is highly probable that the nutritive fluids secreted by the uvea are changed in character when that membrane is subject to toxic inflammation.

There is probably no organ in the body more prone, than the uvea, because of its highly vascular character, to participate in a large group of systemic disorders of the nutritional type; the toxemias and infections. In a word, all the affections of the cardiovascular system in which the kidneys are so uniformly involved, are, I think, quite as liable to have associated disease of the choroid. Not necessarily because of the nephritis, but for the reason that the choroid and retina, and the kidneys have in common become involved in the general disorder. In chronic rheumatism, gout, arthritis deformans, glycosuria, etc., with the phenomena of increased blood pressure, and arterial sclerosis, it is comparatively rare not to find associated disease of the retina and uveal tract.

The high arterial tension, the hypertrophied left ventricle, the chronic nephritis, apoplexies, angina, present a picture of serious systemic disease which the ophthalmologist unfortunately

is all too frequently called upon to witness, because of the associated ocular conditions. It is not reasonable to suppose that the blood vessel system of the eye would escape from participation in the disaster which has fallen with such serious consequences upon the general vascular tree.

Indeed, the ophthalmic surgeon is, not infrequently, the first to detect the insidious approach of the general disorder, since the dioptric system of the eye enables him to study the intraocular tissues under an enlargement of approximately fourteen diameters, and so affords a unique and favorable opportunity to study the pathologic change going on in living structures.

It is under these conditions that he observes the veiling of the fundus details by edema of the retina and choroid in autotoxemia; the innumerable small apoplexies in hemorrhagic retinitis accompanying the later stages of nephritis; in perivasculitis and endarteritis; conditions which so frequently culminate in increased tension of the globe or even in the violent and fatal syndrome of hemorrhagic glaucoma. Indeed, it not infrequently happens that these eye conditions are only the culmination of blood vessel change which has been insidiously progressing, *pari passu*, with that in the general blood vessel system.

This is not the time or place; indeed before this Section it is not necessary to enter upon the etiologic factors in the general or systemic disorders of the nutritional and toxic type. It is my wish only to urge the recognition of the important fact that the uveal tract of the eye may and usually does participate in the general misfortune. In a word, they must be considered as etiologic factors in choroidal disease. The ophthalmologist must first be a physician.

In addition to this important group must be considered the infections: rheumatism, syphilis and tuberculosis as etiologic factors which are always in evidence. Rheumatism and syphilis as the most frequent causes of iritis, iridocyclitis and iridochoroiditis we have long recognized; but I believe the sig-

nal importance of tuberculosis as a frequent cause of these inflammations of the uveal tract has not been adequately appreciated, certainly not until within comparatively recent years. Did time permit, a large amount of clinical material could be brought forward to emphasize its importance. Of late years in rebellious cases of uveal diseases at the Wills Hospital Clinic, and in my private work, the von Pirquet test has been made as a routine procedure, in many instances causing not only local reaction but a rise of temperature. In a large percentage of these patients, recovery was so rapid under the subsequent injections of steadily ascending doses of old tuberculin as to excite one's enthusiasm.

#### UVEAL TUBERCULOSIS

For example, I relate the following case: A large rosy cheeked Italian fruit dealer, came to the clinic with violent pain from an acute increase of tension in the left eye. He was admitted to the wards and placed under treatment until the subsidence of the acute attack. A peripheral iridectomy was then performed, which promptly relieved the tension and pain, but the convalescence was prolonged. The tension was normal but the eye remained red and uncomfortable, and vision did not improve. After two weeks, a gray, discreet deposit was discovered on the cornea in the anterior chamber near the temporal angle of the coloboma left by the iridectomy. It suggested a tubercular deposit. The von Pirquet test was made and was followed by a marked reaction at the site of the test on his arm, and by marked focal reaction in the eye, and a rise in temperature. When this subsided the eye began a rapid recovery. The usual injections of old tuberculin were administered under which the eye became white, the nest of deposit in the cornea disappeared and ophthalmoscopic study of the fundus became possible. There was a deeply cupped nerve and numerous splotches in his choroid, far forward in the ophthalmoscopic field, presumably the site of tubercular infections or deposits. After the iridectomy the infection had passed through the coloboma into the anterior

chamber and formed a nest of deposit on the cornea.

It is probable that in many instances the choroidal patches which are so characteristic of *choroiditis disseminata* are of this nature. A lady, a private patient, who had suffered for a long time from ill health which baffled her physician, and who had received from me glasses correcting a refraction error, but at that time with entirely healthy eye grounds and normal acuity of vision in each eye, came to the office a few months later in great alarm over the loss of vision in her right eye which came on, she said, during the preceding night. In the left eye  $V=6/v$ , but in the right it had fallen to  $1/v$ .

The ophthalmoscope revealed in the nasal fundus a large gray area of edema, the retina being pressed forward, and opaque, but at the center of the gray area at its most prominent point the electric ophthalmoscope showed a dense white spot. The tension of the ball was not increased. The von Pirquet test was made and proved positive causing very slight, if any, ocular reaction. The rising doses of old tuberculin led to a rapid subsidence of the infiltration and a marked improvement in her general health. Vision rose once more to  $6/v$ , but at the site of the tubercular deposit in the eye ground there remained a patch of choroidal atrophy such as are so frequently seen in disseminated choroiditis. No other nodules or yellowish spots were discovered; it was not therefore, of the miliary type which is more common especially in young children.

I have, in many cases of disseminated choroidal patches, with progressive loss of vision and pain in the eyes and head, seen the process arrested by the administration of old tuberculin. Tuberculosis, must therefore, be regarded as one of the more common causes of disease of the uveal tract. Coming under the same category are many cases of keratitis, which show grayish discreet nests of tubercular deposit on the membrane of Descemet, often near the angle of the anterior chamber, or nodules on the anterior surface of the iris. In this connection it should be borne in mind that the mem-



brane of Descemet is embryonically the extension forward of the uveal tract.

To the ophthalmic surgeon these affections of the uvea, whatever may be their etiologic factors, are important, not only as local manifestations of disease, which it is our duty to treat; but because of their dire sequelae. Among these are first of all, the handicap which comes with impaired acuity of vision as in the myopic eye, from pathologic changes in the retina and choroid at the posterior pole, i. e., in the macular region. Second, degeneration of the vitreous body and opacity in the posterior capsule of the lens, and of the lens cortex and nucleus. Third, iritis and iridocyclitis with adhesion to the anterior capsule of the lens and between the root of the iris, the anterior prism of the ciliary body and scleral roll. Fourth, increased tension of the globe as sequel to impaired drainage caused by these plastic adhesions.

In a word, we find in the pathologic affections of the uvea the *fons et origo* of the most serious forms of ocular disease with which we must contend.

#### UVEITIS AND CATARACT

When a young student of ophthalmology, I followed the teaching and example of my instructors in regarding opacity of the crystalline lens, particularly hard cataract, as one of the concomitants of old age, in common with other senile changes. Patients with immature cataract were, therefore, advised of their misfortune but encouraged to wait with such courage and patience as they could command until the cataracts were "ripe" when their vision would be restored by removing the opaque lens. After the importance of errors of refraction as an etiologic factor in asthenopia and pathologic changes in the *fundus oculi* had been demonstrated in the school examination, and the subsequent experience based upon the inductions from that investigation, I began to treat all patients with uveal disease with cycloplegics. And where it was possible to do so, that is to say, if the opacity of the lens permitted, made careful records of fundus conditions, associated asthenopia, etc., and carefully corrected any existing error of refraction; and made a painstaking ex-

amination of systemic conditions. They were kept under observation by occasional return visits. Their comfort was often secured and vision improved. Finally, it became obvious that in many of these patients the opacity of the lens had not progressed; indeed, it was a rare exception for one of the cases so treated to return for extraction.

The case books were then appealed to for corroboration. Sixty cases were found in which the records were sufficiently full for analysis, and were made the basis of a paper on "Incipient Cataract—Its Etiology, Treatment and Prognosis."<sup>5</sup> The results were of signal importance and value. The analysis demonstrated the invariable association of these incipient opacities of the lens with uveal disease and that when this was successfully treated the opacity did not advance and the acuity of vision often improved, but in no instance were the spicules of opacity already present observed to disappear, although the opalescence and swelling of the lens habitually grew less. Since the publication of that paper in 1869, the sixty cases have been increased many times over but the added experience has served only to emphasize the truth of the induction then made and stated in the following conclusions:

"In the stage of incipency, cataract is amenable to treatment by such measures as are calculated to remove the choroidal disease upon which it depends.

"These deductions being true, we are justified in giving a more hopeful prognosis to many persons who apply for treatment with incipient cataract.

"If treatment fails to arrest the progressive degeneration of the lens, the eye will be in a better condition to submit to the trials of operative interference."

If these conclusions are accepted as true, then the designation, "*senile cataract*" is a misnomer and therefore, misleading. Furthermore, experience shows that aged people, who have cataract, are after all is said, the rare exception. It is only a fair deduction that in these exceptional cases there must be some peculiar condition present to cause their cataract. It is the contention of this paper that the impaired health of the eye consequent upon uveal disease had resulted in the



opacity of the avascular lens through disturbance of its nutrition.

#### THE MYOPIC EYE

In the preceding remarks, allusion has been made to increased tension produced by the congested or inflamed choroid leading to distention of the globe in early life, resulting in the myopic eye. This distention in young eyes is not always by any means confined to the posterior pole as in cases of progressive myopia with posterior staphylomata at the temporal side of the optic nerve entrance. There is usually an increase in all the diameters of the ball as well as in the antero-posterior axis. The objective syndrome is interesting and important.

In the presence of the uveal disease the long anterior ciliary vessels, as they course over the sclera in the anterior ciliary region, will be found engorged always suggesting uveal disease; and the sclera often obviously thin and distending. When the pupils are dilated the plane retinoscopic mirror will frequently reveal a granular ring concentric with the margin of the pupil; or a granular cloud in the illuminated pupillary area, which I regard as indicating the participation of the membrane of Descemet in the general uveal disease of the fundus, and indicates the beginning impairment of nutrition of the cornea. The ophthalmoscope shows a fluffy fundus throughout the ophthalmoscopic field, veiling all details.

It is in these cases we observe changes in the corneal astigmatism, either an increase of the astigmatism or a change in the direction of the meridians. These conditions are not confined to the eyes which have passed into myopic refraction, and are comparatively rarely seen in mature adults but are frequently present in young people suffering with asthenopia and portend increasing refraction. After prolonged use of a mydriatic and rest from near work, the fluffy fundus, the clouds in the cornea and the engorgement of the ciliary vessels disappear, while the asthenopia subsides.

#### UVEITIS AND GLAUCOMA.

In adults during middle life, the uveal disease associated, as it quite invariably

is, with systemic affections, presents for consideration a very different group of phenomena. The dilated or engorged ciliary vessels are present, there is failing central vision and contracting fields; the tension of the ball is increased. In the early stage of the disease there may or may not be acute or subacute inflammatory attacks attended by increased pain and dim vision with diminished sensibility, with slight steaminess of the cornea and well marked increase of the tension.

With or without treatment the attack usually subsides and both the objective and subjective symptoms disappear, but there usually remains some increased impairment of function in both the central vision and the fields. After an interval, the attack is sure to return if suitable treatment is neglected. The marked similarity of this history of recurring attacks, to the history of recurrent iritis is obvious, barring the marked increased tension and contracting fields of vision which characterize the glaucomatous eye.

As in recurrent iritis, the succeeding attacks leave additional posterior synechiae at the pupillary margins, so in subacute glaucoma the attacks leave adhesions between the root or periphery of the iris and the anterior prism of the ciliary body and the scleral ring. I have had many opportunities to demonstrate these adhesions in eyes which have come to the laboratory for study after enucleation. Indeed, they are quite constantly present in all the eyes where increased tension had been an important feature in the recorded clinical history. In recurrent iritis, an iridectomy when accompanied by suitable systemic treatment arrests the disease, so in these cases of increased tension with adhesions at the root of the iris the recurring attacks are arrested.

It is the cutting free of these adhesions through a considerable arc at the base of the coloboma in a properly performed broad peripheral iridectomy that gives that procedure a greater value than trephining, which is quite valueless in the majority of cases unless accompanied by iridectomy, and this in any case can only be a very narrow one, thus freeing the adhesion in a very limited arc. It was partly upon these considerations that I

ventured to predict that the employment of the trephine did not meet the requirements as efficiently as a technically correct iridectomy. The theory promulgated for the trephining operation is that it establishes a permanent drainage and thus relieves the tension of the globe. But if we accept the thesis that the increased tension is a sequel of uveal disease it is obvious that the mere fact of drainage will not arrest the degenerative processes going on in the eye. I have seen many examples which seem to buttress the truth of this statement. In brief, the etiologic factors, systemic and local, underlying the uveal disease must be sought for and treated.

Increased tension of the globe assumes at once a wider significance when regarded as a symptom and sequel of disease affecting the choroidal tract and must modify in many important respects the views underlying our treatment. The term "glaucoma" falls from its place as an entity in our catalog of ocular diseases, and must be regarded by the ophthalmic surgeon as only "a convenient appellation" for an important characteristic symptom of ocular disease, but not the disease itself. The acceptance of this view has for many years modified my own concept of glaucoma and controlled my management of eyes with increased tension.

The failure to recognize its etiologic significance has doubtless led to the early adoption of surgical interference at a stage of the disease when other measures should have been first employed. By way of illustration, attention may be called to the great value of iridectomy in the treatment of chronic recurrent iritis, but no experienced surgeon would think of adopting this valuable surgical procedure during an acute exacerbation. The same consideration should be the guide to treatment in those cases of uveal disease with a cataractous lens or in which the increased tension of the globe is the dominant symptom. In short, it is obvious that the underlying etiologic factors both local and general, should be considered, and as far as possible removed by treatment before the adoption of any surgical procedure. The failure to do this, af-

fords sufficient explanation for the unfortunate sequelae so frequently following either iridectomy or any of the more recently devised operations for the relief of increased tension. Notwithstanding the extensively published experience with these modern procedures, I am not convinced that the mere fact that permanent drainage has been secured through an opening at the sclero-corneal limbus is a cure for the diseased condition of the globe culminating in increased tension.

In no other form of ocular disease, inflammatory in character, has the ophthalmic surgeon been so prone to undertake operative procedure as in inflammatory glaucoma. This has seemed to be justified by the rapidly fatal results to vision if relief of high tension were delayed. But if the contention of this paper is true, the early recognition of the essential nature of the disease and the adoption of suitable methods of treatment will, in the vast majority of cases, prevent the violent culmination we all know so well.

#### ESERIN IN UVEAL DISEASE.

It is a well known fact that a very large percentage of the patients who apply for treatment with transient attacks of the symptom complex, designated as "*glaucoma imminens*," are relieved by the instillation of miotics, especially eserine, and that operative measures are not required, if at the same time suitable attention is given to the underlying etiologic factors usually found in general systemic states. Many examples could be brought forward in which under treatment the fellow eye recovered without operation which had proved necessary to the other.

The problem to be solved, however, is a very different one, if the disease has advanced, either through neglect or in spite of treatment, to a stage where permanent pathologic changes in the intraocular membranes have impaired the nutritive functions of these membranes and the drainage channels of the globe have been more or less permanently blocked by connective tissue formation; when the ciliary body is undergoing atrophy and the contracting adhesions have dragged the root of the iris backward and in contact with the scleral ring. We are then,

in my judgment, no longer justified in trusting to the influence of miotics. When we come to consider the physiologic properties of the most efficient of the miotics, physostigmin or eserin, it will be seen why this statement is true.

In answer to an inquiry, "how or why does eserin relieve intraocular tension?" I recall two experiences which have afforded, to me at least, a satisfactory explanation. A young woman with a leucomatous cornea and a blind eye came to the clinic complaining of pain; the old leucoma which had been for years entirely white and free from irritation was vascular, the ball tender to palpation and with increased tension. A solution of eserin was instilled; and at the close of the clinic hour the blood vessels in the white cornea were no longer visible except with the loup; the pain had disappeared and the tension was normal. A short time after a young man presented himself for treatment, giving a vague history of discomfort, occasional attacks of redness in one eye. Inspection showed an arborescent arrangement of blood vessels over the anterior surface of the entire iris. Having in mind the speedy disappearance of the blood vessels after the instillation of eserin in the case narrated above, eserin was instilled and the patient received a solution to be used at home. On his return the following day, the vessels were no longer visible to the unaided eye. The effect of the eserin in these two cases was ascribed to its influence over the muscle fibres in the walls of the blood vessels.

At that time and even now there is much confusion over the physiologic properties of this drug, but all experiments seem to agree that the well known rise in blood pressure after the administration of eserin is brought about by the stimulation of the muscular coat of the arterioles; that physostigmin increases the irritability of both striped and unstriped muscles, even causing tetanoid contractions, the effect apparently being due to the stimulation of the peripheral nerve endings. Local applications, it is claimed cause marked contraction of the pupil by stimulating the peripheral endings of the ocular motor nerve and probably also the iris muscle itself and caus-

ing the spasm of the accommodation by acting similarly on the ciliary muscle.

Now if these observations are correct, eserin is useful in the conditions which have been described as characteristic of the glaucomatous eye by contracting the uniformly dilated ciliary vessels in all of their ramifications in the iris and ciliary region. In this manner the hyperemia would be reduced, the secretion diminished and the general turgescence of the swollen ciliary body and ciliary muscle relieved. The instillation of solutions of suitable strength frequently repeated should therefore, reasoning *a priori*, be of great service in the premonitory stages of increased tension and should hold in check the pathologic processes which culminate in increased tension of the ball. The mistake of using too strong solutions of eserin is often made. It should never cause pain, as this is an indication of muscular spasm or cramp; weak solutions frequently repeated are more useful and are often of great value in the treatment of iritic and ciliary inflammations in alternation with the mydriatics.

But where permanent changes have already occurred, while its use in some measure retards the progress, it is obvious it can not remove or permanently arrest the baneful influence of the permanent pathologic changes at the root of the iris at the scleral ring. The effect of these contracting adhesions between the anterior prism of the ciliary body, the root of the iris and the scleral ring is analogous to the irritating influence of synechia between the capsule and iris after the extraction of cataract, or anterior synechia after perforating ulcer of the cornea and in certain cases of iritic adhesions. It is a common experience that such eyes remain irritable and show a tendency to recurring attacks of inflammation, which subside after the release of the adhesion.

In like manner the tendency to irritation and recurring attacks of increased tension will not permanently subside until the contracting bands of adhesion between the ciliary body at the scleral ring and root of the iris are released. To accomplish this design I know of no procedure which will release these bands thru so considerable an arc of the peri-

phery of the iris as a correctly performed broad iridectomy. It is open to question whether the securing of a drainage wound is correct in principle. Iridectomy, however, should not be undertaken

until by suitable local and general treatment the acute inflammatory manifestations have subsided, and this treatment after iridectomy should be continued until the uveal disease has recovered.

## REFERENCES.

1. Tr. Penn. State Med. Soc., 1877.
2. Tr. Penn. State Med. Soc., 1884.
3. Tr. Penn. State Med. Soc., 1807.
4. Tr. Amer. Ophth. Soc., v. 4, pp. 102, 520.
5. University Med. Mag., March, 1889.

## A NEW "MALINGEROSCOPE."

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NEW YORK.

With a discussion of the present need to discover malingering and ascertain as nearly as possible the actual vision of the eyes alleged to be amblyopic, this paper describes a new instrument for testing the vision of the alleged weak eye while the patient believes that he has seen with the other. The instrument was presented in a paper on Malingering at the annual meeting of the Medical Society of the State of New York, May 23, 1918. It can be obtained from F. A. Hardy & Co.

Visual malingering received but little practical attention from most American ophthalmologists till the passage of the Universal Service laws. The subject has, however, proved not to be so important from the military standpoint as was expected. There has been remarkably little persistent malingering, on the one hand, while on the other it is universally agreed that the persistent malingerer is of little military use. Apparently the officers of the army have often wasted more time and ingenuity in getting rid of these men than the local advisory boards did in getting them inducted.

If we are to judge by past experience, however, the subject may be of vastly greater importance when we begin to settle with the returning soldiers over their disabilities and pensions. It will be of even more importance in civil life because of the rapid and constant growth of accident insurance and industrial compensation. Ocular accidents capable of reducing vision outnumber all other accidents; while no type of injury causes, when real, greater reduction of earning capacity or makes a stronger appeal for sympathy and compensation. There is

no kind of malingering which is harder to detect and to demonstrate.

In industrial work, at least, the detection of malingering is not the sole, or even the most important purpose of the examination, for there is no hard and fast line between exaggeration and malingering. The idea is to ascertain the exact organic and functional capacity of the eye, and the probable cause of any defect found. The success of the examination does not depend on any one or two classical tests but upon the ophthalmologist having a quick appreciation of what an eye ought to do under varying conditions, and on his ability to put the claimant rapidly into positions he has not anticipated, without rousing his suspicions or antagonism. The skill required is psychologic as much as ophthalmologic.

There are two different types of test for malingering; first, those intended to show merely that a supposedly blind eye has sight, and second, those tests which are capable of showing the degree of sight present. To the first class belong the pupillary reactions and many of the various diplopia tests. Their value is the less because they



would often be present in absolutely useless or dangerous eyes. Their chief function is to impugn the credibility and good faith of the claimant. Much more important are the methods which show in some degree the actual vision in each eye. These all depend on making the patient think he is seeing with his good eye when he must be using the poor one alone, and they all imply the apparent use of both eyes together. In this class come the tests involving the blocking out of the good eye by a

The distal end of each tube is covered by a cap which can be rotated, and contains a six mm. aperture, eccentrically placed. The caps can therefore be rotated so that the apertures, while in the same horizontal plane, may be as close to each other as 45 mm. (less than the average interpupillary distance), or any distance apart up to 70 mm. (more than the average).

The patient looks thru the instrument as he would an operaglass, at two ordinary test cards, twenty feet away,

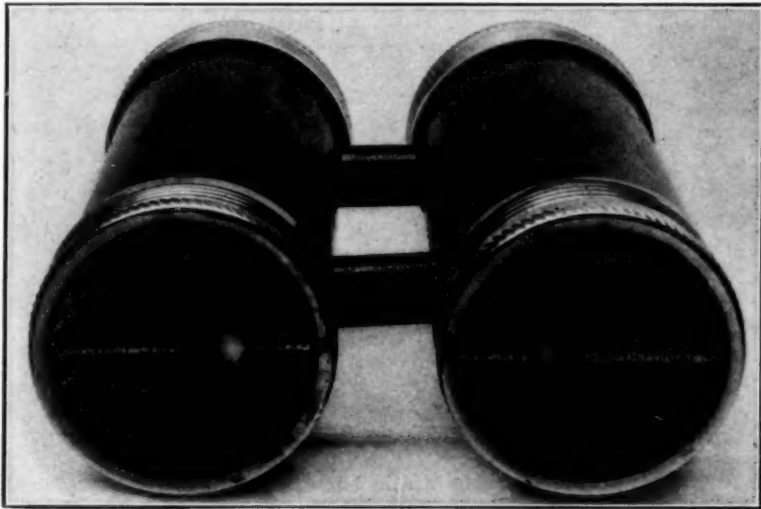


Fig. 1. Alger's new malingeroscope.

strong convex glass, the bar reading tests, the various maneuvers possible with the stereoscope, the reading of colored letters thru colored glasses, and a few of the diplopia tests that appear in all our text books.

Like many other men who have been engaged in Local and Advisory Board work, I have experimented with various "malingeroscopes" and finally worked out the following one which in my hands has been more satisfactory than any single test. It is extremely simple, easily extemporized, and confuses even the very intelligent as to which eye is being used. Fig. 1.

It consists of two short parallel cylinders (four inches by one and one-half), arranged opera glass fashion.

side by side, and about eighteen inches apart. The apertures are large enough to cover the width of one card but do not permit both to be seen at the same time with either eye alone. When the caps are so rotated that the distance between the apertures is nearly that between the pupils (Fig. 2, position 1), the right hand card is clearly visible to the right eye and the left hand card to the left eye (homonymous vision); but neither can see both cards at the same time. When the apertures are approximated slightly (Position 2), so as to permit slight convergence of the visual lines, both eyes see the same card simultaneously. When the apertures are approximated to considerably less than the interpupillary distance,

which is much the most useful arrangement (Position 3), both cards may be seen at the same time, but the right hand card is seen only with the left eye and vice versa (crossed vision). The sensation is that of binocular vision of both cards, but it is

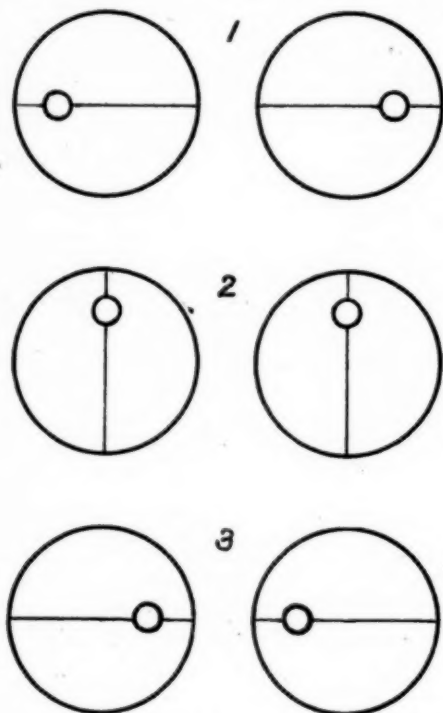


Fig. 2. Diagram showing various positions in which the apertures may be placed in using Alger's malingeroscope.

not quite that, for to read the right card the eyes have to be directed slightly to the right of the mid line, thus increasing the impression that one is using the right eye, while he is actually using the left, and vice versa.

As he looks thru one aperture at either card the image of the other aperture falls outside the macula of the fel-

low eye so that he is conscious of seeing two apertures and these apertures are "crossed," the apparent right one being actually before the left eye and vice versa. If the malingerer is asked to read the right hand card, thru the right hand hole he is apt to think he is using his right eye when he is really using his left. If he is told to read with his right eye, if that is the better one, and a card is held over the (to him) left aperture he assumes that he is really using his right eye and vice versa. In case there is a real difference in the vision of the two eyes, the intelligent patient can often readily tell which eye he is using, but as he has no means of knowing just how much he ought to see with the instrument it is easy enough to blur the vision of the better eye by holding a lens over the appropriate aperture and make him think he is using the better eye.

If two exactly similar charts are used, patients with strong fusion instincts will often fuse them by converging the eyes and see only one aperture and one card. If now extra letters are interpolated at different places on each card the patient will read them just as tho they were on both.

The instrument can be used over a trial frame or the patient's own glasses or it would be a perfectly simple matter to have a cell for lenses fastened to the distal end of each barrel.

The possibilities of deceiving the malingerer when one is familiar with the instrument are very great, the chief precaution being to watch carefully that he does not slyly close one eye. This is, of course, evidence of bad faith, but if the surgeon sits on the side of the worse eye and the instant it is closed puts a card over both apertures the culprit gets very little time for orientation.

## ETIOLOGY OF PHLYCTENULAR OPHTHALMIA.

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This paper urges the view that the essential lesion of the disease is a low grade chronic infection of the ethmoid, with obstruction to drainage, commonly following the acute infectious diseases of childhood. The attacks are provoked by recurring toxemias, especially of intestinal origin. This paper was presented to the Section on Ophthalmology of the American Medical Association, June, 1918.

Phlyctenular ophthalmia is second in economic importance only to ophthalmia neonatorum, and has been a veritable curse to hundreds of thousands of children. The dictum of years gone by that "the child will outgrow it" no longer suffices. True, the little victims did, in many instances, outgrow the disease, but with corneas so badly scarred that their economic usefulness was largely destroyed.

The child with classical phlyctenular ophthalmia is a pitiable sight—the more so because of the frequency with which it is encountered—constantly seeking dark corners, head hanging to avoid the direct light, lids red and swollen, eyes streaming, corneas dotted and clouded by phlyctenular nodules, swollen cervical glands, running nose and excoriated nares and lips, a child picture which, once seen, is never forgotten.

To cure a case of phlyctenular ophthalmia should mean the prevention of recurrences, not merely the relief of an immediate attack. A study of the literature impresses me with the fact that we have wandered far afield in analyzing this condition, and have lost ourselves in scientific discussion, which, altho of intense interest have accomplished little in the way of results.

The final solution of the etiology of phlyctenular ophthalmia must explain certain things: (1) why does the initial attack of ophthalmia so frequently follow the acute infectious diseases of childhood; (2) why does the process confine itself so constantly, in many cases, to only one and always the same eye; (3) why do some of the most violent cases occur among children who appear robust and healthy; (4) why does the removal of pathologic tonsils and adenoids stop the tendency in some children but not in others; (5) why

does restriction of diet benefit but not cure these patients; (6) how does a dietetic indiscretion produce a lymphatic disturbance in an organ relatively remote; (7) why does the tendency disappear at adolescence?

Any theory which cannot answer these queries is not based on facts. Can perversion of carbohydrate metabolism or the tubercular theory explain these things? We all know they cannot.

It is generally conceded that the ocular manifestation is secondary. Where, then, and of what character is the primary lesion? The fact that the tendency remains limited in many cases to only one and always the same eye, over a period of years, is proof positive of a local tissue pathology, if not of the eye, then of some contiguous structure, which may be unilateral. Were a constitutional dyscrasia the principal fault, why should the local manifestation be confined to only one eye? What is the answer?

The relation of ocular disease to diseases of the accessory nasal sinuses has been a study with me for the past twelve years, and I would like to place on record a brief summary of my deductions as to the etiology of phlyctenular ophthalmia, which have no mention in the literature and which, to my mind, definitely explain all the queries made.

I am firmly convinced that the essential lesion in these cases is a low grade chronic infection of the ethmoidal labyrinth, with obstruction to drainage. Altho all patients with suppurative ethmoiditis do not develop phlyctenular ophthalmia, this condition is always secondary to a suppurative ethmoiditis. The ethmoidal labyrinth is the only one of the accessory nasal sinuses present at birth, the others not being devel-

oped until several years have passed (Skillern). The outer wall of this sinus, the lamina papyracea, forms the inner third of the bony orbit, and is frequently the seat of defects in continuity, under which conditions the diseased mucosa of the sinus is brought into very intimate anatomic relationship with the orbital periosteum and the lymphatic channels of the orbit. Different theories as to the etiology of phlyctenulosis, advanced by various observers from time to time, bear an important relationship in that they are based on elements which excite or influence unfavorably the local focus of infection in the sinus. Phlyctenulosis is, in fact, a quite complicated syndrome, involving many factors, any one or more of which may be the actuating element in any individual case.

Skillern, in discussing the frequency of sinusitis in children, says that it is a very common thing for this infection to occur during the course of measles, scarlet fever, pertussis, influenza, pneumonia, etc., and that the resulting tissue devitalization favors a secondary infection of low intensity and chronic character, which may persist indefinitely. All ophthalmologists know by experience with what frequency the initial attack of phlyctenulosis follows these acute infectious diseases.

The excoriated, fissured nares, so constantly seen in these cases, while to some extent the result of the excessive lacrimation, are more largely the result of an excessively acrid discharge from the ostium of the ethmoidal labyrinth, the turgid nasal tissues, *above* the orifice of the nasolacrimal duct, being bathed in a sanious discharge, which gives a peculiar grayish appearance to the nasal mucosa and produces more or less odor. Many of these children develop early an intense atrophic rhinitis with marked ozena. Dr. Coffin, at the Manhattan Eye and Ear Hospital, made a statement about a year ago to the effect that cases of ozena in children, which he has been investigating, were to be found principally among the victims of phlyctenulosis.

The consideration of the elements producing obstruction to sinus drain-

age is of vital importance, as it is only by removing or correcting these elements that recurrences of the ocular manifestations are prevented.

The successful treatment of this disease requires a broad grasp of the etiological factors and the consideration and elimination of *all* the elements which may influence unfavorably the local sinus lesion.

Obstruction may be produced by: (1) an intrasinus secretion which is too viscid or heavy to drain thru a normal, patulous ostium; (2) a mechanical obstruction in the nasal chamber proper.

1. Many of these children without intranasal obstruction to sinus drainage may be free for several years from any tendency to phlyctenular ophthalmia. Later, owing to a degeneration of the intrasinus mucosa, the secretion may become too thick to drain properly, and we then have the essential element—that of obstruction to drainage—with the subsequent development of eye symptoms.

2. The several elements which may produce mechanical obstruction from within the nasal chamber proper are (a) pathologic tonsils and adenoids; (b) deflected septum, spurs, or tight nostrils; (c) many forms of general toxemia, of which the most frequent is intestinal in origin.

A. Hypertrophied tonsils and adenoids produce a stasis in the lymphatic flow, with intumescence and boggiess of the intranasal and intrasinus tissues and obstruction to sinus drainage. The retained, infected sinus contents accumulate under pressure and are forced into lymphatic channels, being carried along lymphatic pathways to the tissues of the conjunctiva or cornea, where they lodge and produce the typical phlyctenular lesions. The removal of such diseased tonsils and adenoids will effect a relief of the condition only when they are the sole exciting factor.

B. As is well known, the separation of the superior maxillae is produced largely by the wedging action of the upper teeth. When these are badly decayed or erupt abnormally, this wedg-



ing action is lost and we find a dental arch flattened laterally, with the incisors projecting to varying degrees, a contracted, highly arched palate, and narrowed nasal chambers, with deflected or spurred septum, produced by the vertical encroachment of the highly arched palate and the consequent buckling of the septum. These cases, almost without exception, have obstruction to sinus drainage on one or both sides, and, if a chronic infection be present, are very likely to develop a typical phlyctenular ophthalmia.

I have in many instances secured excellent results by referring these patients to a skillful orthodontist, who, by spreading the superior dental arch, has so widened the nasal chambers as to relieve obstruction to sinus drainage, and caused the phlyctenular tendency to disappear.

As the child with a phlyctenular history approaches the age of adolescence, the facial and cranial bone spaces develop, the nasal cavities widen, and the impediment to sinus drainage becomes less marked and possibly entirely disappears. Therefore the tendency usually subsides, in the vast majority of cases, at about this age, and remains quiescent, except at such times as the drainage may become blocked by an acute intumescence of the local soft parts.

C. Given hyperplasia of the middle turbinates or accessory sinus tissues (which is constant in these cases), many forms of constitutional toxemia will produce marked circulatory disturbances in the nasal and orbital tissues of the same side, the opposite side remaining normal, if the nasal condition be unilateral. The circulatory disturbance in the nostril proper will manifest itself by an intense intumescence of the local parts, with partial or complete blocking of the breathing space, often with considerable pain and sense of pressure.

The toxemia, in my experience, most frequently found originates in the intestinal tract. Hajek states that indiscretion of diet will produce an acute exacerbation of a chronic sinusitis.

There is a peculiar reflex perversion of the intestinal digestive function, which is constantly found in the entire group of sinus disease, including phlyctenulosis, and which, observation leads me to believe, is produced by way of the sympathetic system. The relation is vicious, in that the autointoxication produced by absorption from the intestinal tract intensifies the pathologic process which produces the reflex. This digestive perversion is simply an instance of the functional disturbance of the digestive act which we now know may be produced by any persistent irritation of the sympathetic system. I have seen many of these cases in which the chronic digestive trouble disappeared entirely or was vastly improved following the correction of a sinus pathology.

The intestinal condition is characterized by acidity, with fermentation, flatus, eructations, etc., the intensity of the functional disturbance varying in different individuals, according to the intensity of the focal irritation to the sympathetic system and the susceptibility of the patient.

Unfortunately, radical procedures for the securing of free sinus drainage—such as curettage of the ethmoid, resection of the septum, or partial turbinectomy—are not usually applicable in childhood. Therefore it is doubly essential that all factors which may influence unfavorably the local lesion be considered, and eliminated so far as may be possible.

Whether the local tissue reaction in the nasal structures, secondary to intoxication of intestinal origin, be an example of anaphylaxis or not is a matter of purely academic interest in this relationship. The essential point is that the focal reaction, with obstruction to sinus drainage, may be relieved with certainty in these cases by a proper regulation of the diet.

The object in outlining a diet should be to exclude those elements which already contain such acids as would add fuel to the fire, and those which, because of indigestibility, would add to the existing status the acids and toxins formed during the process of intestinal

fermentation and putrefaction. My experience has led me to exclude, as a routine, all raw fruits excepting only the citrus group, aside from which Metchnikoff was certainly correct, as regards this group of cases at least, when he stated that raw fruits are harmful, but that cooking renders them innocuous. I do not believe that a carbohydrate free diet is either indicated or desirable in these cases, but do believe that the more indigestible carbohydrates, such as oatmeal, sweet potatoes, and navy beans, should be absolutely excluded and moderation be advised in the consumption of even the lighter starches. We must remember that the diet, to produce the desired result, must be constantly followed, which would be absolutely impossible under many of the projected regimens, as the child's general nutrition would suffer sadly within a short period. Regarding confections, I allow a moderate amount of plain candies—fondants or plain hard candies—occasionally, with meals, but exclude chocolate in all forms.

The ophthalmologist in handling these cases must, perforce, be somewhat of an internist, and study his patient from all angles, would he accomplish results.

In view of the fact that the flow of the lymphatic current from the head is downward, an involvement of the lymphatic glands of the neck is to be expected when there is a focus of infection above. Also, since the inspired air, with its myriad forms of bacterial life, passes constantly over this devitalized focus in the nasal passages, a mixed infection—in some cases tubercular—is certain to occur, and in these cases the various organisms may or may not be identified in the broken-down glands of the neck.

The general medicinal measures for the relief of this condition, which have been employed empirically for many years—the iodids, sodium salicylat, cod liver oil, etc.—have all very definite indications when this relationship is grasped.

In the early acute stages, the internal administration of atropin or bella-

donna in small doses for a few days is often of great benefit, and has been widely employed for years by rhinologists for the purpose of drying up nasal secretion and diminishing pressure. To my mind, in the treatment of phlyctenulosis, this procedure parallels too closely the use of opiates in intestinal conditions, which was largely discarded years ago because, by locking up deleterious elements, it eventually did more harm than good.

The shrinking of the nasal tissues about the ethmoidal ostium, to afford free drainage, and the liberal, daily application of a 2 per cent solution of silver nitrate to the middle turbinate and neighboring nasal tissues, by means of a dropper, is to me a far more logical procedure, as it disinfects the local tissues so far as is possible, depletes the local circulation, and produces a free outpouring of the sinus contents.

The internal administration of the iodids, in *small doses*, further promotes free sinus drainage by causing the secretion to become more fluid, and at the same time tones up the depraved mucous membranes. Large doses of the iodids in these cases are frequently injurious, as the intumescence of the nasal tissues, often seen when large doses are employed, blocks sinus drainage and so defeats the very purpose for which the drug is employed.

#### SUMMARY.

Taking the queries made, in the order given:

1. The primary attack of phlyctenulosis follows the acute infections of childhood so frequently because an infection of the ethmoidal labyrinth has occurred during the disease, and a secondary infection has taken place owing to the diminished resistance of the intrasinus tissues.

2. The process is constantly unilateral in some cases, because only one ethmoid has been infected—that on the same side as the affected eye.

3. Some of these patients appear robust and healthy, because the secondarily infecting organisms are less virulent and the constitution of the

child more resistant to the toxins absorbed from the local focus.

4. In cases that remain clear after a tonsillectomy and adenoidectomy, the tonsils and adenoids, by producing an intumescence of the soft parts above, have been the principal factors creating obstruction to sinus drainage.

5 and 6. Given hyperplasia of the middle turbinate and intrasinus tissues, which is constant in these cases, many constitutional toxemias will produce an intense local intumescence with obstruction to sinus drainage. The toxemia most frequently associated originates by absorption from the intestinal tract, and may be controlled by a proper regulation of the diet. This eliminates one element which may produce obstruction to sinus drainage, but cannot cure the phlyctenular tendency because the toxemia is only a contributing element.

7. The tendency usually disappears

at adolescence, so far as eye symptoms are concerned, because the development and widening of the nasal chambers has relieved the obstruction to sinus drainage.

#### CONCLUSION.

I wish to state that by following the procedure outlined herewith, we have practically eradicated the recurrence of these attacks in an orphanage caring for 1,300 children, to which I have been ophthalmologist for several years, the cases presenting usually being new, and especially following an epidemic in the institution of one of the acute infectious diseases.

I am aware that this course of reasoning may be considered heretical by some, but if the members of the section will study these cases along the lines I have indicated, in conjunction with a competent rhinologist, they will find that the same conclusions must inevitably be reached.

### PERSPECTIVE FOR AVIATORS.

WILLIAM H. DUDLEY, M. D., F. A. C. S.

LOS ANGELES, CALIFORNIA.

This paper discusses the peculiar conditions under which aviators are compelled to judge of distance, and raises the question whether the tests that have been relied on to determine fitness for the aviation service are sufficient.

Perspective in its origin means to see thru, and in its usual application this term answers the purpose well enough, i. e., when applied to terrestrial objects; but when applied to objects floating in the air above the horizon, the conditions are so radically different, that it largely loses its significance. Hence, in contrast with terrestrial, I shall refer to aerial perspective; altho this term is often used with quite a different significance.

In an article appearing in this journal in the April number (1918), by Isadore Franklin (p. 236), discussing the general subject of perspective and stereoscopic vision, the author enumerates the various faculties brought into play in the ability to judge relative as well as positive distances, as: the in-

terpupillary distance, the sense of the play of the muscles, which he states can be of value only within a short distance, the play of the muscles of accommodation which he considers of the next importance; next he considers the blurring of objects out of focus, i. e., objects proximal to, as well as those beyond the point of fixation; but here again the effect is confined to a relatively short distance. Next he states that the apparent size of objects is of great value, and it is my opinion also, that in what might be called terrestrial perspective, these various functions, etc., are of great importance in judging relative as well as positive distances.

For the purpose of testing aerial perspective in candidates for the air service in the U. S. army, the war depart

ment of this country has adopted a method which I understand had been in use by the German government for this purpose for some time previous to the breaking out of the present hostilities; and upon the use of this instrument must depend all of our reasoning relating to the subject in hand. This instrument is simply an ordinary stereoscope provided with a card upon which has been photographed various objects in silhouette so arranged as to give the examinee, with proper aerial perspective the impression of decidedly varying distances from the observer of the objects on the card.

This effect is produced by placing the identical pictures on the two sides of the card at slightly varying distances from each other; those appearing in the foreground having a slightly shorter distance between them than those appearing farther away. This variation in the distance between the pictures on the two sides of the card may be exceedingly small, however, for it is stated that so small a variation as  $1/100$  of a millimeter is sufficient to give perspective effect to one with aerial perspective.

On the card in use by the examiner of candidates for the air service, however, the variation between one set of pictures, and the set nearest is not less than  $1/15$  to  $1/10$  millimeter, and this produces an effect which is quite decided. The card furnished the examiners contains ten sets representing objects familiar to the Teutonic eye, such as castles, forts, lighthouses, cathedrals, battleships, etc., and over each object is placed a small number for identification. Much ingenuity has been used in the setting in order to deceive one who should depend upon anything but his perspective sense. For example, the largest picture on the card, a sailing vessel with all sails set, and placed at the bottom of the card, consequently in the foreground, is really the farthest in the setting, while the one next nearer is a small warship.

When taking up the work of examining candidates for the air service something over a year ago, the writer at once became much interested in this

particular part of the work, and with the hope of satisfying himself as to just which of the special elements of vision, etc., were the determining factors in aerial perspective, private notes were kept in several hundred cases as to (1) the pupil distances; (2) muscle balance; (3) power of convergence and divergence; (4) the accommodation, and (5) the acuity of vision. These, together with numerous cases with abnormalities of these conditions, have been made in the private office; and it may be stated here that the results of these studies have been to upset nearly all of his preconceived notions.

In reference to the pupil distance, it seemed at first that this must be influential in this perspective. Sometime in December, '17, someone in official position appeared to be thinking along similar lines, for we received notice to record this finding—which question was not included in the questions on the examination chart—tho the writer long before this had become satisfied that it had no influence in this kind of perspective, as quite often one with very narrow p. d. would call off the number on the stereoscopic card rapidly and correctly without error, while another with a wide p. d. and with other facilities well developed would make a bad mess of it.

It did seem, however, that accommodation must play an important part in this faculty, till we took occasion to try the test on those under complete cycloplegia when we found that they used the stereoscope fully as well as they did with the accommodation intact. Of the question of vision, it may be stated, so long as it was sufficient to make out details it has not appeared to effect the ability for proper perspective. The varying size of objects seen against the sky is very deceiving to one whose perspective is not good, and in the use of the stereoscope, as previously remarked, the candidate will be almost sure to place the large sailing vessel well in the foreground, while the candidate with this faculty well developed will seldom make a mistake.



The question of the play of the muscles of convergence, however, is not so easily disposed of. Somewhat early in my experience in these examinations, it seemed to me that at least the possession of convergence with somewhere near the standard relation of abduction to adduction, usually reckoned as one to three, must be necessary to be able to qualify in the examination in this test.

Our regulations provided that in case the musclebalance test shows exophoria or esophoria of more than two prism diopters, the relation of the convergence to divergence must equal three to one, in order to qualify. However, after going over several hundreds of these records, it seems that my conclusions will hardly stand.

In giving the details of some of these cases in regard to the muscle relationship which were selected out of many, the numbers must be understood to represent prism diopters of convergence and divergence, abbreviated to ad. and ab. It seems hardly necessary to give the ages of the individuals, as they were mostly between eighteen and thirty, and a careful review does not show that these conditions are especially influenced by age. Among those whose amount of positive and relative convergence was at least fair, and who in spite of this showed quite imperfect perspective, the following have been selected. I will state that these muscle examinations were all carefully made with Reimold's optometer, equipped with the rotary prism, which was used in the examinations.

No. 269: Orthophoric, ab. 8, ad. 19, great difficulty with the stereoscope, disqualified.

No. 552: Orthophoric, ab. 4, ad. 14, no perspective.

No. 785: Orthophoric, ab. 8, ad. 15, perspective bad, disqualified.

No. 173: Orthophoric, ab. 11, ad. 20, disqualified.

No. 126: Orthophoric, ab. 3, ad. 13, disqualified.

No. 548: Orthophoric, ab. 4, ad. 15, disqualified.

No. 179: Orthophoric, ab. 8, ad. 14,

disqualified. This record simply shows that these cases were apparently well supplied with sense of muscle play, tho it was not sufficient for proper aerial perspective; on the other hand, a series of cases with especially bad convergence, both positive and relative, proved well qualified with aerial perspective in the test. For example, No. 484: Orthophoric, had ab. 6, ad. 3, perspective satisfactory. No. 589: Orthophoric, ab. 6, ad. 6, perspective correct. No. 77: Orthophoric, ab. 6, ad. 4, qualified. No. 128: Orthophoric, ab. 8, ad. 8, qualified. No. 274: Orthophoric, ab. 10, ad. 4. (This man, tho qualifying in the perspective test, was disqualified by his 5° of exophoria.) No. 688: Orthophoric, ab. 11, ad. 9, qualified. No. 772: Orthophoric, ab. 12, ad. 8, qualified. No. 193: Orthophoric, ab. 12, ad. 10, qualified.

This shows that so far as our experience goes, in the examination of a large number of prospective aviators, supplemented by a good number of similar cases in the private office, none of the faculties possessed by our eyes and their adnexa appear, singly or collectively to be sufficient in certain cases to provide us with perspective, when we do not have terrestrial conditions to help us. On the other hand, quite a series of cases which appear particularly disqualifying, are able to present a perfect aerial perspective.

Taking into account these considerations, the question arises, upon what then must we depend for our ability to look into space and determine, aside from size, of two or more objects, which is nearer or farther from us. In Dr. Franklin's article, previously referred to, he makes the statement which appears to come very near my own conclusion when he states—"the sense of depth and solidity are neither essentially ocular, nor tactile, nor muscular in their nature; but are a psychic complex, outgrowing principally from three (previously mentioned), senses, but embracing other mental reactions to bodily experience. Or to put it another, briefer way: for our ability to determine perspective in space, the fac-

ulty now under consideration, there must be present some special cerebral center, probably closely associated with centers controlling muscle balance, and possibly some of our other ocular faculties, with which by the aid of binocular single vision we are able to exhibit this particular function.

Now a word in regard to the practical application of these muscle tests. The question has come to mind as to whether the simple examination for exophoria and esophoria in the lateral balance in all cases is sufficient. This precise method having been adopted by those in charge of the examination for the air service presupposes that it is; and yet it seems quite possible that with practically orthophoric conditions as found with the phorometer, it frequently occurs that the convergence is low, and in fact it may have its relation to divergence reversed as oc-

curred in some of the cases reported, and yet be given a passing mark.

The danger of this condition—weak convergence—under the trying conditions in which the eyes of the pilot are placed, Col. W. H. Wilmer has recently stated (*Arch. of Ophthalmol.* v. 47, p. 447). "After the strain of service the tendency of the weak muscle becomes a manifest error, a weak convergence becomes a dynamic divergent squint." From the fact that so many students in the air service die from accident—in many cases it seems an utter impossibility to determine the cause—it appears entirely possible that something of this nature may have occurred, that due to the heavy strain he is suddenly confronted with a double vision, which so confuses him, that he loses control of himself and likewise of the machine, and one more is added to the fatalities of the aviation field.

## OPHTHALMOSCOPY WITH RED-FREE LIGHT OF VOGT.

### Demonstration of Method with Normal Fundus

ROBERT VON DER HEYDT, M. D.

CHICAGO, ILLINOIS.

This is a description of the effects of red-free light upon the ophthalmoscopic image and the method of obtaining such light which was presented to the Chicago Ophthalmological Society, November 18th, 1918.

Vogt, now of the University of Basle, published in 1913 his first reports on ophthalmoscopy with the red-free source of illumination. Since then he has done a great deal of research work in the application of this new method, and reported much of interest pertaining to the normal fundus. To this have been added of late some very important diagnostic observations in pathologic fundi.

Our usual illumination for the fundus, the old petroleum lamp—the Welsbach—as well as the electric bulbs, give a more or less yellowish white light dependent on the temperature to which the respective carbons are heated. A nerve head seen with a white light

will seem more pale and even "atrophic" when compared to one seen with a light more rich in yellow. Therefore the term white is a relative one and in a measure a matter of contrast. The yellow of the macula cannot be seen intravitaly with ordinary illumination on account of too little contrast and too much yellow in the light. The rich in red reflection returning from the sclera and choroid also aid in reducing its visibility.

This yellow coloration of the macula, a much disputed point especially studied and investigated by Dimmer and Gullstrand, is now certain, and can be seen in the living eye by the light filtration of Vogt. He says if we are

able to remove the red rays from the ophthalmoscopic illumination and if the fundus is not excessively pigmented so that it will reflect a fair quantity of light entering, we can make observations by contrast not otherwise possible.

This illumination will therefore be green and in addition its yellow and blue rays may modify it to bluish-green. It is also necessary to reduce the ultraviolet, violet and indigo rays.

The elimination of the red rays from our light could be accomplished by prismatic dispersion, separation and a reuniting of the necessary components. This is technically a complex problem, the loss by elimination, reflection and absorption would too greatly reduce the quantity of light. A method by filtration is probably the most simple; however, the red of the spectrum is the most difficult to eliminate.

Our most common filters are colored lenses made by combinations of white glass with inorganic metals. Also watery solutions of these metals as well as anilin dyes in water, alcohol or gelatin may be used. Great difficulty is experienced in completely removing all traces of red. All combinations of copper acetat solutions on the one hand and anilin dyes such as Malachite green, acid green, brilliant green, etc., have been tried without success.

The blue glass of Schott and Co. is the only known glass to eliminate all red in the thickness of 5 mm. It, however, allows the violet and indigo to pass, which latter are contraindicated for our purpose, besides eliminating probably all of the so necessary yellow.

As filters, Vogt used two solutions contained in 10 c. m. square glass vessels with parallel sides and of about 1 c. m. lumen.

Solution No. 1—Aqueous solution of copper sulphat, 30 per cent.

Solution No. 2—Aqueous solution of erioviridin "B," an analin dye in shade somewhat darker than solution No. 1.

For illumination in arc flame of the projection type fed by a direct current of 40 amperes. Affolter of late finds a

Leitz arc lamp with condensing lens sufficient. This is mounted in an asbestos lined box.

#### NORMAL FUNDUS.

With the red-free illumination many retinal reflexas at first quite confusing are seen. These are due to the absence of the long wave spectral components in the yellow blue light.

When examining with a purely red light by contrast a scarcity or almost total absence of these reflexes is found. Some of the surface reflexes are flat and wander with the motion of the mirror, probably a drawing tense of the retina in certain areas. These are not found in the macular zone. Radial from this zone we often find superficial small linear reflexes, probably folds.

The vessel surface reflexes are similar to the ones seen with ordinary light, except a delicate moss-like area between zones otherwise sharply demarcated is shown with the red-free light.

The yellow discoloration of the lens in age can be measured with this light and the contrast of fundi in monolateral aphakia is quite marked. The retinal nerve fibres are faintly visible with ordinary illumination, especially near the papilla in youthful individuals. With the red-free light, however, they are plainly visible all over the fundus and their course can be followed easily. It is most interesting to trace them towards the macula. The central fibres are directly horizontal. Above and below these are bundles that surround the foveal zone in a close sweeping arc at its temporal border. These are bound by circular enveloping fibre bundles that meet and cross basket-weave-like in a zone temporal of the macula. At first they meet at an obtuse angle which becomes acute and more acute as we recede from the macular zone.

The larger blood vessels are above this layer while numerous smaller vessels can be seen intermingling and at times covered by these nerve fibre bundles.

Fundus vessels seen with the red-free light are black on a light background due to the absence of the diffuse red of the choroid. Of particular interest are some of the findings in the macular region. Here very minute vessels may be followed over the edge of the macula into its depression until they are lost in the foveal reflex. A well-defined, small granulation of the macular surface is seen. Small macular hemorrhages are easily discernible and larger hemorrhagic and exudative zones in choroiditis quite easily located even through a diffusely clouded vitreous.

The foveal reflex ordinarily found only in youthful individuals can often be observed with the red-free light in old age.

The macular zone is of a radiant yellow color and its diameter about one-third that of the disc. It is therefore easily visible and can be located in pathologic fundi in cases where this would be impossible with ordinary light.

It has been conceded and especially emphasized by Haab that the darker red of the macula is due to increased pigmentation. With the red-free light all pigment appears black. There is, however, no black mottling in the macular zone, consequently no pigment. As the macula is now definitely

known and seen to be yellow, its darker red contrast found with ordinary illumination can only be ascribed to an intensification by the yellow coloration. This can be easily shown by placing a yellow lens over part of a red zone the color of the fundus. The red under the yellow lens will be of a more intense red.

We have therefore with the red-free light the first absolute demonstration of the yellow coloring at the macula in the living eye. A new explanation of why this zone is more intensely red with ordinary illumination. The ability to measure this zone more accurately, comparing it with the usually larger size of yellow discoloration found after death.

We can note new details of the macula as respects its size, reflexes and surface, absence of pigmentation (except secondary to disease), vascularization and the direction of vessels. We can also with it measure and by comparison in various eyes study the yellow discoloration of the lens in age.

Most important is the ability to follow minutely the direction of the nerve bundle and fibre layers in the retina—a matter of great importance; as I will endeavor to show in the near future by presenting some new and intensely interesting findings by Vogt in pathologic fundi as shown with the red-free light.

### CORRECTION OF CROSS-EYE DEFORMITY.

J. A. KEARNEY, M. D.

NEW YORK.

This is a review of the author's practice and teaching in the New York Polyclinic Medical School and Hospital, based upon 175 consecutive operative cases.

The chief concern of cross-eyed patients is the correction of the deformity. Cross-eye (Strabismus Squint) cases as a rule are seen in consultation by the eye surgeon at certain ages and under certain conditions and it is always interesting to note the compelling cause of the first visit.

The child in arms is seen by us when a worried mother notices the infant's eyes are crossed, next period when as a sensitive youth he suffers deeply the gibes of his school companions, somewhat later on when he is chagrined to find that because of this deformity he is unable to secure a position for which



he has trained and is perfectly capable of filling, still later on in life when he discovers that the operation for the correction of squint is not a serious one and that it is possible to obtain a good result at any time from nine years of age onward. Certain other compelling conditions are familiar, the young girl who is not invited to parties given by her friends on account of her appearance, the young person during courtship for obvious reasons, and the cross-eyed who are avoided by superstitious people. No other case is more gratifying than when a client applies for the correction of a squint deformity referred by a patient upon whom you have operated.

Strabismus is paralytic (partial, complete), or concomitant (monocular, alternate). In complete paralytic squint the eye is in malposition and can not be voluntarily moved in the direction of the paralyzed muscle; in partial paralytic squint the eye in faulty position can voluntarily be rotated in the direction of the paralyzed muscle, but not to the normal extent.

In concomitant squint the eyes rotate equally, the affected one maintaining the same angle of deviation in all positions. Each eye fixes alternately in alternate concomitant strabismus; and in monocular concomitant strabismus one eye fixes and the other constantly deviates. Vertical concomitant strabismus is uncommon and we have to do chiefly with lateral deviations, convergent and divergent concomitant strabismus.

An infant with a noticeable squint requires a careful direct method ophthalmoscopic examination of the fundus of each eye. They are neurologic cases when we discover as we frequently do edematous changes in the fundi, that indicate an increase in the intracranial pressure. Measurement of the degree of intracranial pressure should be made and recorded at once, by a spinal mercurial manometer at lumbar puncture to verify the fundus findings; and if it records a decided increase above the normal, the excess of pressure is usually due to an intracranial hemorrhage at birth. There

is generally a history given of difficult or instrumental delivery of the child and subsequent occasional convulsions. Spasticity and other neurologic disorders are the usual sequellae of birth hemorrhages, unless the clot is removed and intracranial pressure relieved by a decompression operation. If this procedure is deemed necessary the earlier it is done the better. Often we find in the fundi of cross-eyed infants optic discs that are decidedly pale thruout (atrophic), as the result of faulty development in embryo and sometimes associated with stigmata (high palatal arches, cleft palates etc.) elsewhere from the same cause. These are neurologic cases also.

Mentally normal children with strabismus, in which no changes are noted in the eye grounds, with or without errors of refraction existing, or in which recent exudative changes are observed become the subsequent charge of the ophthalmologist.

Since no one cause has been ascribed for strabismus, the usual attending abnormal factors may be looked for and corrected if possible, the earlier the better. Errors of refraction, amblyopia and faulty fusion are the usual concomitants.

If an error of refraction is present suitable lenses worn constantly give the best results in correcting a squint deformity at a period when a child's eyes are observed to be crossed at times and straight at others, no matter what angle of deviation obtains; or when the angle remains constant and is less than 15 degrees. Glasses may be worn by children as young as one and one-half years of age, and it is never too early to prescribe a correction for an existing error of refraction in a developing strabismus. Correcting lenses, however, seldom have any effect upon a squint deformity of 15 degrees and over, if the eye that turns remains in malposition for three months or longer.

The correction of faulty fusion is rarely successful because of the immaturity of the patient at the time the treatment would avail; and even under the best conditions excessive dili-

gence is required to get a small percentage of good results. An occasional good result is obtained in amblyopics when the affected eye is compelled to fix by placing a correcting lens before it, and shutting off fixation of the good eye by a shade, or atropinizing it.

Conservative methods have been tried out usually, on all strabismic patients who are particular about their looks, before the operative age (9 years) is reached; and when an eye surgeon is consulted a review is made of the history and treatments that had been given, and if stated nonoperative methods have failed to correct the deformity then surgical measures are advised.

Operations upon the external ocular muscles for the correction of squint are advisable when the patient is 9 years of age and over, and all necessary nonoperative measures have been tried and have failed to correct the deformity. The choice of procedure depends upon the character and angle of strabismus that exists, and the nature, and extent of lateral rotations. Under usual conditions the deformity in all concomitant strabismic eyes may be corrected to parallelism by definite surgical procedures.

If the external lateral rotation of the squinting eye is found to be normal, in monocular concomitant convergent strabismus that measures 15 degrees of deviation, a complete tenotomy of the internal rectus of the affected eye usually corrects. If the deviation measures 30 degrees a complete tenotomy of the internus followed by an advancement of the externus of the squinting eye usually corrects. If the deviation measures 45 degrees complete tenotomies of the interni of both eyes usually correct.

However, if it is determined that the external lateral rotation of the squinting eye is not sufficient, but the amount of deficiency is made up by excess of internal rotation, or in other words the lateral excursions are equal, but the plane of rotation is advanced to the nasal side, then an advancement of the external rectus is done first and usually corrects a deviation of 15 de-

grees when it exists. If the deviation measures 30 degrees an advancement of the externus is done first and when the reaction subsides the internus of the same eye is completely tenotomized and usually corrects. If the deviation is 45 degrees an advancement of the externus of the squinting eye is done first followed by a complete tenotomy of the internus of the same eye when the reaction of the advancement operation subsides, and later on an advancement of the externus of the good eye usually corrects.

When tenotomies are indicated in concomitant convergent strabismus a complete tenotomy of the internus corrects 15 degrees and if less than 15 degrees are to be corrected, partial tenotomies are done. When advancements are indicated in concomitant convergent strabismus 15 degrees are corrected by the usual placement of stitches in the externus, but a little more or less can be accomplished by entering the stitches on either side of the usual position.

In alternate convergent concomitant strabismus advancements of the external recti of both eyes are done and the amount to be corrected is divided between both eyes. If the advancements do not correct the entire amount of squint, for the deviation remaining, partial tenotomies of the interni of both eyes are done and should be equally divided between them.

In the divergent type of concomitant strabismus, tenotomies of the external recti have very little effect upon the cosmetic result but the advancement of the internus may be regulated to correct up to 45 degrees of deviation. This is a most satisfactory procedure on account of the good size of the internus muscle, and experience guides one in the placement of stitches to correct various amounts of deviation.

Operations for the correction of paralytic squints are unsatisfactory as a rule, but it is possible at times to pull and fix an eye in straight position.

The usual complete tenotomy in which the aponeuroses of the muscle as well as the tendon are severed, and the advancement operation, a modifi-

cation of Landolt's, give the best results in the writer's hands. In the last 175 consecutive operations for the correction of squint deformity, parallelism has been obtained in all of them.

There were 155 monocular convergent concomitant, 16 divergent concomitant, 3 alternate convergent concomitant and one convergent paralytic (complete).

## HYPERPLASTIC EXUDATIVE RETINITIS (NONHEMORRHAGIC).

J. W. JERVEY, M. D.

GREENVILLE, SOUTH CAROLINA.

The report of four cases and statement of reasons for grouping them as illustrating this form of retinitis. A thesis submitted, and accepted, as a candidate for membership in the American Ophthalmological Society, 1918.

True hyperplastic, exudative, non-hemorrhagic phenomena in and apparently adjacent to the retina are rare. The appearances which they present to ophthalmoscopic examination are frequently similar to, and perhaps often indistinguishable from, the lesions resulting from previous hemorrhagic extravasations. In fact, the ultimate result, subjectively and objectively, of organized hemorrhagic and nonhemorrhagic exudates might conceivably be pathologically identical, as in the lesions of retinitis proliferans, which may have their origin in either form of exudation.

This latter form of retinitis is of course described in all modern text books, but the rarity of its occurrence may be realized by the statement of Weeks that he had seen but two cases in twenty-four thousand private patients, and of Schöbl, quoted by Weeks, who observed five cases out of 179,057 patients. The common acceptance of its etiology is hemorrhagic extravasation from the retina into the vitreous. It has been pointed out, however, that it may occur consequently upon the ejection of a fibrinous exudate or coagulum, with or without the presence of blood corpuscles (Weeks).

Leaving out of consideration, for the present, cases of retinitis circinata, which will be referred to later, the writer has observed at least four cases showing lesions in six eyes, of what ap-

peared to be true organized retinal exudates, nonhemorrhagic, three of them being confined within, or adjacent to the retinal layers, and one combining this type with the currently described type of retinitis proliferans extending into the vitreous body. In none of these cases was there any evidence of previous or present hemorrhage at the site of the lesions, and in all except one the development of the processes was watched from week to week and month to month under ophthalmoscopic observation.

In view of these observations, which are detailed below, the writer suggests that proliferating or granulating or chronic inflammatory (neoplastic) tissue may occur within as well as without (with an origin within) the retinal layers; that it may occur without preceding hemorrhagic phenomena; and that whether within or without the retinal layers these lesions may properly be classified as hyperplastic exudative (nonhemorrhagic) retinitis.

From all that is known of retinitis circinata, it would seem justifiable to include this type in the above classification, the difference in the ophthalmoscopic picture being due merely to the different arrangement of the lesions.

The identification of hyperplastic exudative retinitis with the conditions described by Coats in 1909 as a "disease of the retina, hitherto insufficiently differentiated, which is charac-

terized by the presence in the fundus of large masses of white or yellow exudation; usually there are also groups of cholesterol crystals and hemorrhage" (Massive Exudation of the Retina, (Coats), seems more than possible. There seem to be, however, some interesting points of difference. For instance, Coats states that "in the only case of this disease which has so far been examined in a recent stage, the white mass in the fundus was found to be due to a disintegrating hemorrhage." In three of the subjoined cases the growth and development, and in one case the retrogression of the lesions, were observed by the writer over a considerable period of time, and at no time could hemorrhage be suspected of having a part in the origin or progress of the lesions.

Coats remarks that "in an allied form of the disease, or in a variety of the same form, strange types of vascular disease are found—fusiform and globular expansions, kinks, loops, glomeruli, etc.,—as well as the more common types, such as constriction, white ensheathing, etc." Interestingly enough, this "allied form" occurred in the left eye of Case I, described below, the right eye having been enucleated after destructive blindness had ensued on a continued development of the hyperplasia and excessive glaucomatous tension.

In at least two of these cases, II and IV, a neogenetic vascularity was observed as a part of the hyperplastic processes. This vascularity has an apparent tendency to disappear from ophthalmoscopic view after a longer or shorter lapse of time, but whether from actual resorption or from becoming obscured by cellular infiltration of leucocytes or the development of fatty degeneration, it seems difficult to determine, tho the writer inclines to the two latter hypotheses. The evidence leading to this conclusion was quite marked in the case of the enucleated right eye of Case I. Here the chief lesion was about the entrance of the optic nerve. In enucleation the nerve was severed three or four millimeters behind the bulb; and surrounding the

nerve, beneath the sheath, and giving it a somewhat lobulated appearance more than twice its normal size was a mass of what looked macroscopically like chronic inflammatory, or granulation tissue with finely spun vascular elements—certainly well organized hyperplastic tissue, and certainly a part of the process ophthalmoscopically observed; and from indications at the time, proved by subsequent events, evidently not malignant. There is no doubt that this process extended further up the nerve than the point of severance. In Case II a well marked, fine vascularity appeared in the exudative mass, subsequently disappearing from ophthalmoscopic view.

In none of the writer's cases were there any of the stigmata of lues, inherited or acquired, and repeated examinations clinically and by laboratory methods of cases I, II, and IV, failed to show positive signs of either syphilis or tuberculosis. In none was there a history of trauma obtainable, except as noted in report of Case II, below. It is true that in Case I, while the second eye was giving us some concern, Dr. G. E. de Schweinitz, who was the consultant in the case, reported that there was a strong positive reaction to the von Pirquet test. However, this was subsequent to repeated subcutaneous and von Pirquet tests previously made (with negative results) under the writer's direction, and the possibility of anaphylaxis may be properly considered. Dr. de Schweinitz quotes the clinician's report as follows: "Altho the physical signs at the right apex are not sufficient in themselves to make a diagnosis of tuberculosis, and an X-ray examination is always a little uncertain, when these are taken together there seems little doubt that a lesion in the upper lobe exists, and the probability is that the lesion is a tuberculous one." Fifteen months have elapsed since this report was made and no further evidence of tuberculosis has been obtainable.

In all the cases except III (who was seen only twice), all possible points of focal infection were satisfactorily eliminated from consideration as etiologic



factors except as follows: Case I had suspicious faucial tonsils, which were enucleated; and later X-ray examination of the various sinuses gave apparently positive evidence of an old right mastoid infection. This mastoid was opened and cleaned out, but there proved little evidence of diseased processes present. In Case IV it was discovered that active pus tonsils were present, and these were promptly enucleated. The effect of the removal of these foci in Case I is rather difficult of estimation, but on the whole it may be said that the result appears satisfactory. At any rate the remaining eye is in a more quiescent condition since this interference and vision is normal with correction. In Case IV a sufficient time has not yet elapsed since the removal of the tonsils to warrant a statement of intraocular effects, tho the patient expresses herself as feeling much better generally.

In these cases the circulatory, intestinal, and kidney functions were repeatedly, and the writer believes, carefully and thoroly investigated with results negative in informative value. Cases I and II showed undoubted benefit from massive doses of iodid of potash, but this can hardly be taken as indicative of anything definite as to the etiology.

After observing for several months the development of the process in Case I, right eye, the writer had made a diagnosis of probable malignant tumor. Dr. de Schweinitz, however, after a careful study of the case, suggested "massive exudation of the retina—Coats," or else the rarer type described by von Hippel under the name of "angiomatosis retinae," but concurred in the advice to enucleate the eye, "inasmuch as in either circumstance the eye is sure to go on to secondary glaucoma and complete blindness, and as a staphyloma is already beginning to form in this eye." The writer is now convinced that de Schweinitz's diagnosis of massive exudation was practically correct.

With these cases as suggested above, it would seem proper to classify, clinically, those conditions of exudative,

nonhemorrhagic retinitis which are typified by the so-called retinitis circinata, retinitis proliferans of nonhemorrhagic origin, and the hyperplastic retinitis of syphilitic and traumatic origin which are not of hemorrhagic formation. The cases of the type which the writer is reporting (like retinitis circinata and retinitis proliferans of nonhemorrhagic origin) must be regarded for the present, as idiopathic—much as we may dislike the term; tho we must necessarily accept the dictum that may be tersely put in this form: In the presence of exudate there must be a departure from the vascular normal. This, for the present, is as far as we can get etiologically.

The suggested classification would come entirely within the purview of Fuchs' statement (Textbook of Ophthalmology—translated by Duane, Fifth Edition, p. 589) of the anatomic changes in retinal inflammation, and would serve to clarify and make more readily understood the diagnosis of certain rarely observed and hitherto seldom recognized conditions whose ophthalmoscopic changes and pathology have been veiled in more or less obscurity.

(It is a matter of deep regret to the writer that, owing to a mistake on the part of his pharmacist in furnishing too strong a solution of formaldehyd, the eyeball enucleated in Case I was rendered unfit for laboratory examination, tho Dr. de Schweinitz and his pathologist made every effort to use it.)

#### ABSTRACT OF CASES.

Case I. June 10th, 1912. C. S. C. White, male, age 15 years. School boy. Excellent family and environment. Right eye went suddenly blind (in space of two or three days), two months before this date. Constant severe parietal headaches right side. Health otherwise good. Nothing of interest in previous personal or family history, except that his father died several years previously of some obscure stomach trouble (probably malignant). V. R. E. equals L. P. V. L. E. equals 20/30—.50 S equals 20/20. No external evidence of disease. Ophthal-

moscopic examination of R. E. reveals severe advanced type of neuroretinitis with macular exudations probably going on to atrophy. L. E. shows beginning of papillitis. Tension R. E. equals +1 (palpation). Clinical examination shows no evidence of any sinus involvement. Sent to hospital for treatment.

June 16th. After several days' treatment at hospital with pilocarpin sweats and eliminants, the whole right eye is acutely inflamed (uveitis). Excessive tension and eye very painful at times. Applied leeches to right mastoid.

June 21st. Right eye comfortable and inflammation apparently slightly less. V. L. E. equals 20/20. During this time urinary, blood, heart, chest, and general systemic examinations have been carried out, all with negative findings.

July 1st. Possibly slight improvement in appearance of right eye. Subconjunctival injection 15 minims 1-5000 cyanid of mercury with  $\frac{1}{2}$  of 1 per cent acoin.

July 7th. Stopped mercurial inunctions which had been used for some days and ordered sodium salicylat grs. 15 every three hours.

July 9th. Inflammation right eye improved.

July 11th. Another subconjunctival injection.

July 16th. Papillitis in left eye almost cleared up.

July 28th. Inflammation right eye slowly, but steadily improving.

August 5th. Dismissed from hospital and sent home to Gaffney, S. C. Right optic disc very edematous, pale, and elevated about 3 mm.

August 26th. Suspicion of exophthalmos, R. E. Sclera still much congested. Anterior chamber shallow. Pupil 4 mm. diameter. Nearly entire visible fundus white, hazy, and elevated three to four mm. Is this a neoplasm originating in optic nerve?

September 10th. Large white area with heavy bunches of vascular formations seems to be growing steadily in right fundus now occupying almost the whole visible fundus and best seen with

+13 lens, indicating elevation of over 4 mm. Eye, of course, is totally blind. (At this time I advised an enucleation of the eye with a probable diagnosis of malignant growth and a suggestion for a consultation. Dr. G. E. de Schweinitz, of Philadelphia, was consulted with the result that he concurred in my advice as to an enucleation, but differed in the diagnosis as stated above in this article. Previous to this time von Pirquet and subcutaneous tuberculin tests had been made under my direction with negative results.)

October 24th. The right eye was enucleated by the writer. At this time the tension had increased to such a point that in places it was evidently telling on the integrity of the eyeball, and the elevation of the growth in the fundus was 5 mm. (The macroscopic appearance of the bulb and severed nerve is referred to in the previous part of this article. As stated above, an error on the part of the pharmacist in supplying a solution unfortunately ruined the eyeball for microscopic examination, and indeed even for gross examination. This was a serious loss, as opportunities for such examinations in this type of case are undoubtedly rare.)

November 16th. Uneventful recovery from operation with good movable stump for prosthesis. V. L. E. equals 20/15.

December 1st. Prosthesis fitted. (Patient has been wearing artificial eye comfortably ever since. There have been no subsequent evidences of trouble in the right orbital tissues.)

Here follows history of left eye from this date:

January 25th, 1913. Patient complains of slight asthenopia left eye. V. L. Equals 20/20 —, corrected with —.25 cyl. 45° equals 20/15. The fundus appears normal.

May 1st, 1913. Left eye, fundus appears normal except perhaps slight haziness at the edges of papilla and rather large veins. V. equals 20/15 with correction.

October 6th, 1913. Retinal venous engorgement and papillary haze. Vi-

sion with  $-1$ . cyl. axis  $180^\circ$  equals 20/20. Advised refraction again.

October 13th, 1913. Slight conjunctival congestion. Vision with correction equals 20/15. Ophthalmoscopic examination negative.

October 13th, 1915. Mild acute conjunctivitis, recovered in a few days. Fundus normal.

May 20th, 1916. Vision with correction equals 20/20. Fundus normal.

October 3rd, 1916. Slight asthenopia. Homatropin refraction shows net correction to be  $-.50$  s.  $\ominus$   $-.50$  cyl. axis  $160^\circ$ . This was not a satisfactory examination and I did not accept results as conclusive. Ophthalmoscope shows retinal congestion, whitish glistening corrugations and roughness in region between papilla and macula and suspicion of stellate streaks about macular region. Macula not marked. Excessive formation of fibrillary blood vessels, very tortuous, in this region. Vision with correction (before using homatropin) equals 20/30. Advised examination of heart and kidneys.

October 4th, 1916. Vision with  $-1$ . s.  $\ominus$   $-.50$  cyl. axis  $180^\circ$  equals 20/20, minus. Dr. Jordan reports heart and kidney examination negative.

October 7th, 1916. Retinal vessels less congested.

October 19th, 1916. Acute follicular tonsillitis.

October 21st, 1916. Eye and throat better.

October 26th, 1916. Fundus still improving.

November 8th, 1916. Double tonsillectomy.

November 27th, 1916. Vision  $-1$ . s. equals 20/20. Ordered constant. Fundus same as last examination. It will be seen that there has been a gradual increase in refraction from  $-.25$  cyl. a little over four years previously to  $-1$ . s. in November, 1916. I am inclined to think, therefore, that the clinical signs in the fundus may be explained as accompanying a mild progressive myopia.

Dr. de Schweinitz was again consulted at this time, at an interval of two months after I had last seen the case. At this time he wrote me as fol-

lows: "The large stringlike band of white tissue about the disc and the oval hemorrhages made me think, in view of the condition (which had previously obtained), of the other eye, that an early proliferating retinitis is beginning." To this letter I promptly replied that when I had last seen the patient two months previously, neither of these lesions were present.

On January 31st, 1917. Dr. de Schweinitz wrote me suggesting a probable diagnosis of tuberculosis as referred to in the first part of this article.

February 12th, 1917. I again saw the patient and noted in the fundus "suggestions of proliferation" along the upper sweep of one or two of the temporal vessels. This was somewhat in the nature of hazy sheaths running parallel to the vessels, but the "stringlike" bands observed by Dr. de Schweinitz had disappeared. The patient was put on increasing doses of iodid of potash and vichy water, and was allowed no use of eye for near work.

March 26th, 1917. In the extreme upper field of fundus are several patches of what look like spots of chorioiditis with some pigmentary deposits and crossed by an evidently adventitious and tortuous vascularity. The suspected proliferative signs along the upward sweep of the vessels still persist. The patches above referred to can only be seen on wide dilation and extreme rotation of the eyeball.

April 4th, 1917. Taking 24 grs. KI, t. i. d. Choroidal patches plainly smaller and less congestion about them.

April 10th, 1917. Lesion in upper fundus smaller and less marked. V. L. E.  $-1$ . s. equals 20/20+.

April 16th, 1917. Patches in upper fundus smaller and show less vascular disturbance. Just to nasal side of these patches is a fresh hemorrhage about one-eighth size of the disc.

May 2nd, 1917. Patches less marked. Hemorrhage one-fourth size of disc. V. equals 20/20—, with correction. Now taking KI 50 grs., t. i. d.

The apparent hemorrhage persisted for several months, but seemed to be

reduced in size, altho remaining a bright red. In October, 1917, in the course of an X-ray examination of all of the sinuses, a diagnosis of an old mastoid involvement of the right side was made. In November, 1917, the mastoid was opened with the findings referred to in the first part of this article.

At the present time, April, 1918, the eye is quiet. Vision, with correction, equals 20/15. The patches in the upper fundus are much smaller. There is some tortuosity of numerous small vessels. The faint parallel streaking persists along one vessel in the upper fundus, and the apparent hemorrhage, which is now not more than 1 by 3 mm. in size (ophthalmoscopic magnification), still remains as a bright red spot. I have come to the conclusion that this is not a hemorrhage, but a small aneurism. All treatment has been discontinued, but the use of the eye for near work has been restricted and the patient will be kept under observation from time to time.

Note: It would seem that this interesting case was one of true hyperplastic exudative retinitis of nonhemorrhagic origin in the right eye, evidently not a malignant growth as subsequent events have proved; and in the left eye one of the "allied forms" of the same disease to which Coats has referred. Evidently the vigorous treatment with iodid of potash was of decided benefit, for the process has undoubtedly not only been checked, but has undergone at least partial resolution.

Case II. April 25th, 1916. Mr. S. W. F., Newry, S. C. Age 30 years. Farm overseer. Three days ago noted sudden diminution of vision of left eye. Has had frequent, but not severe pain "behind eyes." Had fall on back of head about one year ago, stunning him. V. R. equals 20/20 no acceptance. V. L. equals 20/200 no acceptance. Homatropin and retinoscopy show practically emmetropia. Ophthalmoscope shows slight fluffiness of papilla, left. Faint yellowish reflex over macular area. Tension normal. General health excellent. Positively denies

specific history. Does not use tobacco or alcohol. Left pupil slightly larger than right. Does not react as well to mydriatic. Possibly intracranial tumor or ruptured vessel. R KI in increasing doses.

May 1st. V. R. equals 20/20. V. L. equals F. 4 feet. (Central vision. He seems to have a fair eccentric field.) Ophthalmoscope, left, shows a disc of white over macular region, about size of papilla; hazy edges and a few minute vessels, not elevated. I noted a peculiar faintly yellowish reflex at this point a week ago. Evidently a tumor. Continue KI. Wassermann reported negative.

May 12th. Same as May 1st. General examination, including chest, heart, kidneys, etc., by competent clinician, negative. Continue KI.

May 26th. Exudate is irregularly oval and somewhat lobulated. No longer any traces of vessels on this formation. Seen clearest with a -2. lens in ophthalmoscope. Evidently subretinal. Whole fundus slightly hazy. Taking 32 drops KI, t. i. d. Ordered continued increase. The exudation above referred to is about the diameter of the disc horizontally, and a little over half of this measurement in the vertical line. I think undoubtedly one of the rare cases of massive exudation of the retina.

June 2nd. V. L. equals 20/200, eccentric. Macular patch undoubtedly smaller, being less than a disc diameter horizontally and less than one-half of this vertically. Considerable dustlike opacities in vitreous suggests choroid involvement. Now taking 46 drops KI t. i. d. Continued treatment.

June 20th. Improving. Exudative mass about one-half size of a month previous, about same general outline. Shades off at periphery as if undergoing absorption. Now taking 80 grs. KI t. i. d. Continued at 80 grs. for ten days.

July 1st. V. L. equals 20/200, eccentric. Exudate slowly absorbing. White glistening area less than one-fourth former size and somewhat triangular shape shading off over original area into normal retina. Decreasing



dosage from 80 grs. KI. Continue atropin and protection.

July 15th. Few sparse punctate glistening retinal spots just above central fundus. Cholesterin? Central lesion slowly absorbing with slight tendency to pigmentation. Patient again declares absolutely no tuberculosis has ever existed in any branch of family. V. L. equals 20/200 (not central).

July 22nd. V. about the same as a week ago. Exudate still clearing. Pepper dust opacities in vitreous persist.

Aug. 4th. Only small pigmented spot about size of split pea (ophthalmoscopic magnification) at macula. Slight pinpoint vitreous opacification. Discontinue KI for two weeks and start again.

Sept. 1st. Left macula steadily clearing. Small pigmented spot remains. V. equals 20/200, eccentric. Minute vitreous opacities.

Sept. 15th. Improving steadily. V. R. (eccentric) equals 20/200. Had to stop KI week ago for saturation. Resume next week. Left macula now appears as having faint, grayish appearance, in size one-half diameter of disc horizontally and one-third disc diameter vertically; ovoid, and at lower center a darkly pigmented spot.

Oct. 6th. V. L. +1.s., (atropin) equals 20/200, eccentric. Vitreous clearer; macular condition about same as last visit.

Nov. 2nd. Macular patch smaller and less distinct. Now of more regular ovoid shape, and about one-eighth area of disc in size. Dismissed for two or three months.

Note: There can be no doubt that this was a case of exudative hyperplastic formation of organized tissue. The unusual opportunity was here presented of observing the clinical development from the time vision was first seriously impaired by what was evidently a retinal or subretinal fibrinous or plastic exudate, to an organized vascular formative period, and on to final partial retrogression, with undoubted permanent functional impairment. At no time was there the slightest trace of hemorrhagic phenomena participat-

ing in the origin or growth of the lesions. The patient did not return as instructed, but the reporter is endeavoring to get in touch with him.

Case III. November 30th, 1915, Mr. D. C. C., aged 35 years, book-keeper, complains of asthenopia, frequent styes and chalazia; wearing: R. +1. cyl. 90°; L. +0.75 cyl. 90°. V. R. equals 20/20 +1.50 cyl. 90° equals 20/20. V. L. equals 20/70 +1.50 cyl. 90° equals 20/20. Retinoscopy checks this finding. Ophthalmoscopic examination negative, except perhaps rather hazy discs.

Dec. 7th: V. R. equals 20/30 +1.50 cyl. 90° equals 20/20.

V. L. equals 20/200 +1.50 cyl. equals 20/50. R. fundus somewhat congested and slight "knobby" appearance of papilla. L. fundus shows papilla markedly "knobby" and gray and white mottled, much like a piece of popcorn, with faint suggestion of vascularization. Apparently exudative (?) condition around papilla and latter is distinctly elevated (about three diopters). "Massive exudation of retina." (?) Ordered Crookes' glasses and advised careful watching and further examination. (This patient was of the neurotic type and became dissatisfied when I told him his trouble might be serious. He did not return after this second visit, altho his family physician made every effort to get him to do so. Eighteen months later his physician told me he was complaining sorely of his eyes, but would do nothing for them.

Note: This case, in the space of seven days, showed a transition from slight papillary haze to a well marked organized tissue formation without the slightest evidence of hemorrhagic antecedence. Nor had his family physician—a very capable man—ever suspected lues.

Case IV. September 29th, 1917. Mrs. W. M. E., Honea Path, S. C., housekeeper, aged 55 years. Vision has recently been failing. No pain or inflammation in eyes. General health good. For some years has been wearing reading and distance glasses, fitted by opticians; the present ones recently fitted. V. R. equals 10/200 —2. s.

equals 20/100. V. L. equals 20/20 and no improvement with any glass.

Ophthalmoscopic examination reveals in the right eye a very edematous retina with a few bright yellow spots (cholesterin?), one to two millimeters in diameter (ophthalmoscopic magnification), in macular area, and between that and disc. The disc is surrounded by an area of white with grayish clouding (probably edematous infiltration). There is a persistent canal of Cloquet, the anterior end of which is quite opaque. Tension normal (palpation). Left eye edematous retina and disc. Tension normal. There is no sign, symptom, or history of syphilis, tuberculosis, or trauma, and no indication of hemorrhages.

October 12th. Ophthalmoscopic appearances about same. Patient's family physician reports heart, kidneys and blood pressure normal, and patient otherwise sound. V. R. —2. s. equals 20/100, V. L. equals 20/20.

Examinations on November 30th and January 1st, 1918, show little change.

February 1st, 1918. Increasing infiltrated area around disc, right eye, being more pronounced at temporal side, where it is about two-thirds of a disc diameter in width and somewhat narrower on nasal side of papilla. The appearance of the infiltration presents the popcorn or cumulus cloud effect, and is best seen with a —5 lens in the ophthalmoscopic aperture. Fine vascularization is noted. The left eye shows indications at temporal border of disc of the same process commencing as obtains in the right eye. The patient has no teeth. A careful examination of the nose and paranasal sinuses is negative. There are, however, small diseased tonsils, exuding pus on pressure. V. R. —5. s. equals 20/100 (note myopic increase). V. L. equals 20/40, no improvement with any lens.

March 1st. V. R. —5. s. equals 20/100, V. L. equals 20/30. The exudation about the right disc is bulging out still more in temporo-inferior area. In left eye the exudate now encircles the disc in a band about one-eighth disc diameter in width. Attached to the nasal side of this band is a thin, finely

organized opaque veil like substance, presenting edgeways in the vertical plane, about one-half disc diameter in vertical width, and waving in the vitreous. The appearance suggests proliferative retinitis, with a suspicion of fine spun vascularity. Patient is just recovering from an intercurrent attack of bronchitis.

March 27th. V. R. —5. s. equals 20/70, V. L. equals 20/30. Fundi about same.

March 28th. Double tonsillectomy; local anesthesia.

May 3rd. The organized exudate about the right disc is increasing, being now a full disc diameter in width temporally and inferiorly. There is undoubted fine vascularization. From the hyperplastic mass, spreading for two-thirds of the way to the macula is a whitish haze of exudation, roughly triangular in shape with base the width of the new growth, beneath the nerve fiber layer and with characteristic appearance of serous retinitis, evidencing the extension of the exudative process. Organization of this exudation can be seen to be taking place along the course of some of the vessels, contiguous to the already organized mass. Tortuosity of vessels elsewhere in retina. Increased evidences of degenerative changes in macular area, and between that and disc. Several irregular bright yellow spots of varying sizes and shapes are noted, and in some are faint appearances of pigment deposits in centers. Growth and fundus best seen with —7 lens. The left fundus shows marked tortuosity of vessels. The proliferating tissue at nasal side of disc is appreciably less well defined and seems to be atrophying. V. R. —7. s. equals 20/200+, V. L. equals 20/30. Tension (Schiotz tonometer), R. E. equals 18, L. E. equals 18.

Note: There is an evident increase in the anteroposterior diameter of the right bulb, in marked contrast to the behavior of the left bulb, tho the pathologic process in each eye is clearly progressing. This phenomenon, it seems to the writer, can only be explained on the ground of the exertion of traction posteriorly by the process

as it extends backward along the nerve trunk. There is no evidence of lenticular swelling or keratoconus. The lesion at the disc could not possibly be confused with the so-called posterior staphyloma of progressive or high myopia, which, it is now recognized, is not a staphyloma at all, in the real sense of the word. The whole history and picture would confound the suggestion of such confusion, tho perhaps the writer's inadequacy of description might incite such a criticism.

#### CONCLUSIONS.

There is a retinal pathologic entity consisting of organized hyperplastic tissue evolving from fibrinous or plastic retinal exudates of indeterminate origin.

These exudates are not of hemorrhagic character, tho it would appear that they must necessarily have a vascular pathogenesis; and the tissue into which they are determined would seem to be analogous to granulation or chronic inflammatory tissue.

The clinical phenomena manifested can evidently be divorced from syphilitic, tubercular, or traumatic causation, tho unquestionably resembling the lesions sometimes seen consequent upon these origins.

The hyperplastic organizations are characterized by a white or grayish or

yellowish or mottled appearance, in form suggesting a piece of popcorn or miniature cumulus clouds, showing a fine vascularity at some period of their development; of no fixed size; usually, it would seem, in one mass, often highly elevated from the retinal level; when in the active formative stage usually with well marked peripheral definitions; with a minimum of pigmentation or none at all; and, in the writer's observation at least, with points of selection for their development either in the papillary or macular area. If in the disc area the organized exudates probably always extend along the nerve trunk beneath the sheath. They are, of course, essentially benign.

As the pathologic morphology and clinical appearances of these lesions are evidently similar (tho usually distinguishable by location, arrangement, anamnesis, and instruments and methods of precision), to those of retinitis circinata, retinitis proliferans of non-hemorrhagic origin, and certain forms of syphilitic, traumatic and perhaps tubercular retinitis, it would seem appropriate for clinical study and for the minimizing of a certain obscurity, to group all of these, for differentiation from other types, under the descriptive head of Hyperplastic Exudative Retinitis—Nonhemorrhagic.

# NOTES, CASES AND INSTRUMENTS

## OCULAR ACTION OF DICHLOR-ETHYLSULPHID (MUSTARD GAS).

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This is a preliminary report on the action of mustard gas in man, as seen at the Edgewood Arsenal. Authority to publish granted by the Board of Publication, Surgeon General's Office.

The reactions in the eyes to dichloroethylsulphid depend upon the duration of the exposure, and the dilution of the gas. Many of our cases were exposed for a period varying from one to thirty days, to the air contaminated by the gas in the plant where the dichloroethylsulphid was manufactured.

The continual leaks would have a varying effect upon the men, depending to some extent upon their susceptibility. Eyes once affected by the gas seem more prone to a second attack, and the period between attacks grows shorter, as the men are returned to work. Some cases exposed to the vapor or fumes leaking from pipes or stopcocks, would become affected with smarting of both eyes in from one to six hours. Many of the men would continue work during their shift, go to their barracks and to bed, be awakened during the night with intense pain and report to the hospital in the morning. In some cases where the gas would escape in jets as from manometers, rubber tube attachments, etc. and the face sprinkled with the chemical, the reaction would be immediate, and result in severe burns. Our cases ranged in severity from the mild conjunctivitis, with slight lacrimation and photophobia and only slight injection of the conjunctivas, radiating from the limbus in a triangular area toward the inner and outer canthi, and the width of the palpebral fissure, with pearly white conjunctiva above and below, to the high grade conjunctivitis associated with edema of the lids and chemosis.

The conjunctivitis has been arbitrar-

ily divided by us into the mild, medium and severe forms.

The mild form shows only a slight degree of injection of the triangular area above mentioned, with very slight or no lacrimation but a decided photophobia. The photophobia seems to be marked from the incipency of the attack, and the pain is usually of a smarting nature. The cornea clear, pupils small, active to light and accommodation, and the iris negative.

The medium cases show congestion of both the ocular and palpebral conjunctivas, with the straight scleral vessels engorged and tortuous, and the very fine vessels visible. Here the lacrimation is profuse and the photophobia intense and associated with blepharospasm. The lids may be glued together by the secretion but this is rare as the secretion is watery and seems to be more lacrimatory, and unaccompanied with a thick viscid discharge. No hemorrhages are visible, but the vessels seem on the point of rupture.

In the severe form, edema of the lids is marked, and the predominating symptom. In some cases the swelling of the lids is on a level with the supra-orbital ridge, and extends to the nose. On forcibly retracting the lids, the secretion squirts from the eye onto the cheek, in clear, colorless, limpid droplets, which rapidly reaccumulate. The skin is red, tense, hot and the patient complains of pain in the skin and the eye.

The conjunctivas are intensely injected, both palpebral and ocular, chemosis is present and minute hemorrhages, scattered in the lower segment of the ocular conjunctiva, toward the culdesac, rarely above the median line and we have yet to see a hemorrhage on the palpebral conjunctiva.

In this variety the photophobia and lacrimation is intense, blepharospasm continuous, and the oculodinia of a high grade. The cornea remains unaffected and with the fluorescein test is negative. Pupils remain small, active to light and anterior chamber negative.



Our first cases were treated with rest in bed, cold compresses, cocain for the first day, once or twice; atropin twice daily. These cases remained in the hospital for from three to six weeks, depending on the severity of the reaction.

Latterly we have been using cocain for only one instillation, and for its immediate quieting effect. Atropin, three times daily for its continued physiologic effect, cold compresses, boric acid flushing, iodoform powdered into the eye twice daily, yellow oxid of mercury salve to the lids and a Liebreich bandage for from three to seven days, or longer as the case requires. Under this plan of treatment, the stay of patients in the hospital has been decreased to seven to fourteen days, with rapid amelioration of all symptoms.

It is our opinion that the deleterious effects of dichlorethylsulphid upon the eyes, can best be treated by antiphlogistic measures, ignoring to a considerable extent the chemical composition of the affecting gas. To look for a chemical antidote to neutralize its action in the eye, would more than likely lead to a substance as severe in reaction as the poison itself, whereas, by treating the inflammatory symptoms, immediate relief is obtained, insofar as pain, lachrimation, photophobia and swelling are concerned. Previous to the use of the mercurial salve externally, about five (5%) per cent of our cases developed chalazia, hordeola and small multiple abscess of the lids; but since its introduction into our routine treatment, we have had no such complications.

## SCLERITIS AND EPISCLERITIS.

HUGH MILLER, M. D.

KANSAS CITY, MO.

These notes were read in connection with the presentation of a case before the meeting of the Kansas City Eye, Ear, Nose and Throat Club, October 17th, 1918.

The etiology is somewhat obscure and probably from a constitutional disturbance rather than a local affection. We find in literature that the following are

causative factors: Rheumatism, tuberculosis, syphilis, menstrual disturbances and others.

Rheumatism itself has been obscure in etiology. We now attribute as a causative fact of rheumatism toxic absorption principally from the oral cavity, pyorrhea and tonsils. So we would at this time say simply toxic absorption. It is a question whether we have true scleritis and episcleritis from tubercular bacilli. As to syphilis I have been unable to find any literature definitely showing characteristic scleritis except where it is secondary to iritis or keratitis.

That it may be from menstrual disturbances I have doubts. I have had but three cases in my experience, two in men and one woman; in the latter there were no indications of genital disturbances. The tonsils and dental pyorrhea are the places where we should seek for an explanation of these conditions. I am quite confident that scleritis is a local manifestation of constitutional absorption of toxins. Our most recent observations in toxic absorptions are explaining many pathologic conditions that previously were obscure.

*Objective Symptoms.*—We find some millimeters from the cornea a hyperemic area with an elevated slate colored center. There may be one or more of these areas at the same time, on the same eyeball. Seldom are both eyes involved at the same time. These areas are variable in size and shape, depending upon the intensity of the disease. It may be simply episcleritis, involving only the tissue covering the sclera, or it may extend thru the entire thickness of the sclera, in fact include the choroid as has been shown by microscopic investigation.

*Subjective Symptoms.*—Dull, heavy ache is the usual nature of the pain. Sometimes sharp shooting pain. The pain is produced principally by pressure, as I desire to show further on. There is lachrimation and slight photophobia. The diagnosis is made by the inspection of the eye, where we find the characteristic areas.

*Progress.*—The healing of one area requires from two to six weeks. Oftentimes before the first has recovered, a second or third inflammatory area has

appeared, which may be near the original site or on any part of the anterior hemisphere of the globe, usually several millimeters posterior to the border of the cornea. It is known to be recurrent and chronic and to run on several years. Prognosis is favorable as to sight, provided the intraocular tissues are not involved. When the choroid, ciliary body, or iris becomes involved, prognosis is unfavorable.

*Sequels.*—After the inflammatory period is past there is left in episcleritis simply a dusky area. But in scleritis the conformity of the globe has changed. In one case I had, an anterior staphyloma appeared at each point of the inflammatory area. The inflammatory process had almost completely encircled the globe so that these nodules reminded one of a potato, that had taken second growth. There may still be vision in eyes that have had such inflammation, but the irregular astigmatism produced is next to impossible to neutralize.

*Treatment.*—Treatment in our text books has principally followed the lines of that suggested by etiology. I believe now that we should look for some local source of the infection with a purpose of shortening the course of the disease. I desire to present a case to-night for the purpose of bringing out some points in the foregoing discussion:

*Case.*—Mr. G. F. of Kansas City, Mo., came to my office September 7, stating that he had had a cinder removed which had been buried in the sclera. The eye was still painful and he desired that I ascertain if there were more foreign particles. I found but a red area and no remaining particles of cinder. I dismissed him feeling that there had probably been a foreign particle embedded. This original area I now believe, was simply the beginning of his present trouble; and there probably had been no cinder there at all, but the small and darkened spot had the appearance of a foreign body which some one had attempted to remove.

On the 29th of September he presented

himself to me in great pain. I found deep episcleritis or scleritis near the site of the former area, and sent him to the hospital. For a week following September 29th he suffered great pain, notwithstanding he was taking fifteen grains of salicylat of soda every four hours, and atropin instilled in the eye every six hours. He finally became easier. The above drug kept him quite comfortable. About October 10th he had another flare up, pain exceeding that which he had had on the previous occasion, when on inspection I found this second area beneath the upper lid. Saturday morning, the 12th of October, I operated on this last inflammatory area.

The operative procedure was as follows: After dissecting freely the conjunctiva and episcleral tissue down to the dark elevated area I transfixed it with a fine cutting instrument. It is necessary that the transfixing instrument enter at a tangent to the eyeball. Promptly the discoloration disappeared (five days later the bluish discoloration reappeared, but it is a flattened area instead of a tumor as before). I dressed the eye with a pad of gauze and put the patient to bed.

In a brief survey of the literature I have not found any describing this procedure for scleritis. While it is a new idea I felt it was a rational one and at least could do no harm. Tho this operation may not prohibit attacks in other locations of the sclera or hasten complete recovery it would seem to lessen the danger of extension toward other internal ocular structures.

The operation gave instant relief from pain, and the patient has had perfect comfort to the present time. Before the operation drugs only partially relieved the pain, since then none has been necessary. I can most certainly recommend the procedure so far as the comfort of the patient is concerned. The influence on the disease is yet to be determined. As to this patient's tonsils, they are to be removed at an early date and I hope to make a further report on the case.

## REPORT OF COMMITTEE ON STANDARDIZING TEST CARDS.

Presented to the Section on Ophthalmology of the American Medical Association, June 14th, 1918.

The work of your Committee for the past year has been done on the figures designed for the testing of those who are not familiar with the letters of the various alphabets. Essentially the same plan of comparative testing of the different figures was used. Over 180 different figures have been tested, the collection and preparation of these figures having been done by Dr. Ewing.

The Committee has thus selected the accompanying characters from among the various designs which heretofore have been submitted by authors on this subject.

Small variations in the size of letters would be subject to criticism because of incongruity to the eye, but small variations in the size of the figures here considered are not noticeable; provided the figures are well proportioned and are arranged to line up evenly with one another. The choice is based on the following principles:

(1) The lines of which the chief frame work of the character is constructed should each subtend the angle of one minute.

(2) The main body of the character should conform to the five minute visual angle.

(3) Slight unobtrusive variations may be made in the lengths of the lines of the characters beyond the five minute angle, in order to insure legibility; as it is practically impossible to construct pictures of ordinary well known objects in the five minute space with lines of one minute thickness.

(4) Masses of black are undesirable.

(5) Finer lines than subtend the angle of one minute are to be avoided in the body of the character.

(6) As any one character cannot be depended on for a visual measurement, the smaller characters for distances less than 20 meters should be arranged in rows of three or four each. The

reading of the row is considered by the Committee to be the equivalent of  $V=1$ .

The interval may be in any ratio, but the geometric ratios of Green, are suggested as being the most advisable.

The characters suggested by the Committee are those indicated in the accompanying diagram. They consist of the ring, square, star, pitcher, cross, horseshoe, flag, fork, and chair. They should be printed in black on a creamy white background and the paper or board should be of sufficient hardness to prevent the type sinking into it.

There is a distinct advantage in having a relatively small number of these characters repeated on successive lines of the chart. Because in this way it



Figures suggested for testing illiterates, recognized at 5 meters by V-1.

can be known from the larger lines whether the person tested understands, and responds properly to the test.

The characters suggested by the Committee are for subjective tests to meet the requirements of useful vision. They conform so well to the letter tests that the two may be readily interchanged.

In addition to the characters here presented, the several more accurate tests, ordinarily designated as "one minute" tests in contradistinction to the five minute tests, have been considered.

These are the Snellen "E," the Landolt "Broken Ring," the Jackson "Incomplete Square," the "E" and the Incomplete Parallelogram forms of Pergens, also the several varying one to

three minute tests of Pergens, the "Cross-point" and "Line-point" tests of Wolffberg, and the Central Broken Line test of Ewing. Taken singly each of these tests is practically the equivalent of the others. They are excellent for employment in the final checking up test, when there is any question of a fine degree of visual acuity involved; and for the repeated testing of persons with greatly reduced vision.

The trouble with each of them is that the location of the "one minute" test must be indicated either by pointing to it, or by naming the position in which it is to be placed. This, including the instruction with regard to the test which must be given the patient, requires a greater amount of time than the simple naming of a test object. However, the Committee recognizes that these "one minute" tests are necessary for the exact comparison of the vision of the same eye at different times, or of one eye with that of the

other, or for comparing the exact vision of different individuals; and advises that every ophthalmologist have one or more of them on hand in case special accuracy is demanded.

For obtaining an idea of the vision of very young children the Committee indorses the suggestion of Worth, that balls of various sizes be employed. However, in place of the ivory which is used by Worth, a noiseless material as paper, yarn, cork, or rubber painted white or black to contrast with the background would be superior for the construction of the balls.

Semaphores are special tests for railroad and signal service employment, although they may be considered tests for the illiterate. The Committee recommends those designed by Dr. Charles H. Williams and by Dr. N. M. Black.

EDWARD JACKSON,  
NELSON M. BLACK,  
WALTER B. LANCASTER,  
A. E. EWING.

## SOCIETY PROCEEDINGS

### NETHERLANDS OPHTHALMOLOGICAL SOCIETY

#### FIFTY-SECOND MEETING

DR. C. NICOLAI in the Chair

Translated from the *Nederlandsche Tijdschrift v. Geneeskunde*, March 16, 1918, by E. E. Blaauw, M. D.

#### Experimental, Toxic, and Anaphylactic Inflammation.

F. WIBAUT starts from Kümmel's investigation to produce inflammation in the rabbit's eye thru anaphylaxis. He describes the pathologic-anatomic changes found in his experiments. He found a moderate inflammation in the iris, especially at its posterior surface, a much more severe inflammation in the ciliary body, and extensive diffuse and focal inflammations of the choroid. He mentions destruction of the retina, slight changes in the vitreous, and in the choroidal foci mononuclear leucocytes with epithelioid and giant cells.

Kümmel concluded that these inflam-

mations greatly resemble sympathetic ophthalmia; that these investigations prove that focal inflammations in the uvea do not need to be of bacterial origin; that if blood or pieces of tissue of sufferers of sympathetic ophthalmia produce inflammation in the rabbit's vitreous, this may not lead to the conclusion of the bacterial origin of sympathetic ophthalmia.

Von Szily, Adalbert Fuchs, and Meller protested especially against the first conclusion of Kümmel. Repeated experiments gave in general similar results, from which they, however, draw different conclusions. They are inclined to consider the changes due to the first injection. The inflammation is then in general toxic, and has the character of an *endophthalmitis septica* (Meller); but this Wibaut rather calls a hyalitis. It is the picture of a very serious inflammation of the ciliary body, especially of the tops of the processes; the retina is severely af-



fects and often destroyed. Serious changes in the choroid are also found, the more as the retina has suffered. If the retina was not affected or previously detached, the choroid was least affected or not at all. And if an exception is found, Meller reduces this to particular circumstance of the specimen. The giant cells he found are "foreign-body-giant cells" formed around tissue fragments, and especially pigment granules. The "*anaphylactic ophthalmia*" corresponds with the endophthalmitis septica in the following points: 1. The exudative character; and affection chiefly of the ciliary body, especially of the tops of the processes, and the retina. 2. The change of the exudate into connective tissue with formation of "Schwarten" with retina and ciliary body, and the appearance of large cells, as epithelioid and giant cells. 3. The dependence of the affection of the choroid on that of the retina.

Meller does not consider these changes as anaphylactic, but considers them more as depending on the poisonous character of the serum of the first and second injections. Among the described eyes there is, however, one which even to him has shown anaphylactic phenomena. The first injection was in the vitreous and a renewal of the inflammation followed an intravenous injection. The iris was found richer in cells with nodular foci and plasma cells, moderately strong exudation of and infiltration with round cells in the ciliary body. The retina has suffered only in its fine texture, the choroid contains more cells than normal; the cells lie in groups, chiefly plasma cells, with tendency to break thru the pigment epithelium. The optic nerve is inflamed and the choroid shows in its neighborhood more changes than elsewhere.

Wibaut used for first and second injections freshly sterile horse serum. After injection of this in the vitreous, a rabbit's eye shows only in the first days a slight vitreous opacity and slight hyperemia. An eye injected three days ago with 0.2 cc. horse serum

shows large fluid-blebs in the epithelium of the ciliary processes, the fluid contents of which are somewhat strongly stained and contain some remains of the vitreous.

The anaphylactic inflammations were produced by a first intravenous injection followed, after an incubation time of some 14 days, by one single injection in the vitreous. After 24 hours rather regularly a severe inflammation is found with much exudate in the anterior chamber, deposits on the membrane of Descemet, swelling and hyperemia of the iris, and formation of synechia. The fundus is hardly seen thru vitreous opacities. An eye enucleated 5 hours after injection shows, as the only change, blebs in and below the epithelium of the ciliary body. These are to be considered a beginning of exudation.

At 24 hours after the injection the eye showed the clinical signs of very severe iridocyclitis. The cornea was nearly normal. The anterior chamber contained polynuclear leucocytes and lymphocytes, many with pigment granules. The exudate formed also some spots on Descemet's membrane. There was the commencement of infiltration at the pupillary margin, and a little more at the irisroot. The ciliary body showed extensive inflammation. The ciliary processes were much thickened, and in all folds was formed exudate.

The thickening was partly due to infiltration, with strong hemorrhagic diapedesis, partly to edema. The infiltration contained chiefly polynuclear leucocytes, but the mononuclear elements began to show. The hemorrhagic diapedesis was so great, that at first view one thinks of an extensive hemorrhage. But tissue elements between the red blood cells diffusely dispersed, proved the contrary. The superficial as well as the pigment epithelium suffered severely in numerous places and were partly absent. The same blebs are found as in the first stages, but now filled with red blood corpuscles and exudate cells. Some few mononuclear lymphocytes in the vitreous. The choroid showed local thickenings thru

infiltration with mononuclear cells, with a small perforation of the pigment epithelium. The retina was normal. The sclera and the episclera tissues were much infiltrated; especially around the limbus, where was also a large focus with polynuclear leucocytes, and hemorrhagic diapedesis, which continued in the loose connective tissue of Tenon's capsule.

Another eye, also enucleated 24 hours after the second injection, showed a somewhat more advanced stage. An extensive exudate was in the anterior chamber, with many more mononuclear cells, and still more pronounced in the corneo-iridal angle. It comes in a stream from the pupillary space, but seems also to be formed by the anterior surface of the iris. A few Descemet spots. Hyperemia of the iris and infiltration of the pupillary margin, irisroot and in the deeper layers, where the ciliary processes originate. The ciliary body is more inflamed than in the foregoing case. The processes are filled with exudate, and also the crypts and folds. The mononuclear cells, chiefly lymphocytes, have become more numerous than the polynuclears; hemorrhagic diapedesis was found only in a few places.

The pigment epithelium had suffered seriously; in different places it was pierced by the exudate. In the surrounding tissues were found loose epithelium cells, with pigment free, pigment granular, and mononuclear lymphocytes, which have taken up pigment granules, slight exudate in the vitreous, a slight perivascularitis here and there in the retina, and some polynuclears at its surface toward the vitreous. A little exudate in the excavation of the optic nerve. A large focus was found in the choroid in the neighborhood of the ora serrata; and also in other places diffuse and focal conglomerations of mononuclear leucocytes, distributed thru the entire thickness of the choroid.

An eye enucleated three days after the anaphylactic reaction shows a picture resembling the foregoing, without polynuclears in the ciliary body. The retina was not much changed. In the

excavation of the papilla there was a distinct papillitis. The choroid showed over its entire extent focal inflammations. Between the foci, the inflammation was less, or the tissue even entirely normal. Even the layers toward the sclera took part. Where the foci increase the pigment epithelium is often pierced and the leucocytes come outward. The retina is there lifted up, with damage to the cones and rods. Next the dark nuclei of the leucocytes were seen, much paler larger oval nuclei, which resembled the nuclei of the pigment epithelium.

Wibaut has shown with these specimens, that it is possible to produce inflammation along anaphylactic ways, which shows the picture of a rather clear uveitis. The focal appearance of the inflammation is rather remarkable, because a toxic agent was introduced, so that a diffuse inflammation could be expected. Wibaut thinks that Kümmel went too far, when he spoke of a great resemblance with sympathetic ophthalmia. But on the other side these pictures are very different from those of septic endophthalmitis. The second conclusion of Kümmel, that it is possible to produce a focal inflammation thru toxic means, is very important for our general pathologic thinking. Also the third conclusion will not find much opposition. A single injection of human serum in rabbit vitreous produces toxic conditions. The specimens resemble more the description of Kümmel and his critics, and indeed look very much like endophthalmitis septica.

DISCUSSION.—Wolff would have liked to hear the name of Wessely, who first did excellent work regarding anaphylaxis of the eye.

Van den Borg asked if the neuritis must be regarded as directly anaphylactic or as secondary to the cyclitis.

Mulock Houwer asked how to explain the focal character of the inflammation.

Wibaut claimed no definite idea as to such explanation. Vessels are not always seen in the center of the foci, so they are not always perivascular infiltrates. He did not know that Wes-

sely already had done these experiments; he considered the neuritis as secondary.

#### **Ocular Changes after Epidemic Cerebro-Spinal Meningitis.**

G. TEN DOESCHATE examined 50 convalescents from meningitis. Twice he found a diminished vision 6/9 to 6/18, without fundus changes. In 8 cases paralysis of the accommodation was found, in 3 after 18, 17, and 10 months after the attack. Perhaps the accommodation disturbance depends on affection of the nasal cavities.

Spontaneous nystagmus was found in 25 of 48 patients. Some were free in the beginning, but the nystagmus appeared during the course of the rather long examination. Fatigue may have been the cause. Many of the patients, however, had labyrinthine-cerebellar changes, and other symptoms of the posterior cranial cavity lesions, so that an injury of the fourth ventricle, especially of Deiter's nucleus, may be surmised. Four times anisocoria was found and twice an irregular pupillary circumference. These and slight eye muscle changes might not depend on the meningitis. In one patient, however, an abducens paresis was found.

A distinct concentric limitation of the fields for white and colors was found in ten patients, and in four for colors alone. Three times this was combined with an enlargement of the blind spot, while in five cases fundus changes were observed. The light sense was diminished in three patients. Six times venous hyperemia and four times one sided redness of the papilla were seen. Choroidal changes were found in seven cases, mostly peripheric foci; and once a distinct atrophy of the anterior part of the choroid combined with hemeralopia. In all these choroidal affections labyrinthine changes were also found.

In four cases the papillary borders were indistinct with venous hyperemia, and once there was a greyish discoloration of the peripapillary region. Temporal atrophy with enlargement of the

blind spot was seen once. Once in both eyes radial reflexes appeared around the macula lutea, while between the papilla and disc the reflexes were vertical. Vision, R. 2/60, L. 3/60. Abnormal pigmentations of the yellow spot were found twice. In one of these cases the macular reflex was a lying rectangle. In 35 patients the blind spot was mapped; with a 1 cm. object at 2 meters distance from the Bjerrum screen. Five times it was enlarged, once both, 4 times on one side. It was considered abnormal when the horizontal diameter was larger than 7 degrees.

The limits for white and colors were about the same. This may suggest an affection of some nasal sinus. With epidemic cerebrospinal meningitis, affections of the posterior nasal sinuses are found. The degeneration of the "peripapillary bundle" could then be produced by stasis or by toxins. But it could also be possible that noxious products from the cranial cavity penetrate in the intervaginal space of the optic nerve, whereby the superficial peripapillary fibers suffer the first and most. In the case where the blind spot was found enlarged in both eyes, both maculas were abnormal, while the disc margin was partly hazy. In one of the other patients the papilla was pale at the temporal side, which points to a more extensive affection of the optic nerve.

**DISCUSSION.**—Zeeman asked if the light sense disturbances were found with choroiditis or neuritis, and if the choroiditis and neuritis were found in the same patient.

Ten Doeschate found light sense disturbance with and without choroiditis. In the case with choroiditis and neuritis the blind spot could not be examined.

#### **Signs of Graves' Disease.**

W. P. C. ZEEMAN demonstrated a patient with remarkably distinct symptoms of Dalrymple and von Graefe, altho other symptoms of Graves' disease or of any other neurologic condition were entirely lacking.

**Pulsating Exophthalmos from Multiple Myelomata.**

W. P. C. ZEEMAN was prevented by her death a few weeks before, from presenting a patient whose clinical history he considered it worth while to relate. A 53 year old woman admitted in December, 1915, with an affection of the left optic nerve. Since a few weeks she had complained of a haze before the left eye. Wassermann positive. In spite of specific treatment her condition became worse. She returned home and was not seen again until the end of June, 1916. The eye was then blind, and had come slowly forward. The eye was proptosed to 7.5 mm., straight forward. The pupil was a little wide, and did not react to light. The disc was pale, especially at its temporal side, light was not observed. A probable diagnosis of orbital tumor was made, perhaps starting from the optic nerve.

As another antiluetic treatment was ineffective, operation was performed at the end of July after resection according to Krönlein. The exophthalmic globe was beginning to show pulsations. No souffle was to be heard with the stethoscope; the patient herself did not notice bruit. The diagnosis remained of an orbital process situated directly at the optic nerve, or an aneurism of the ophthalmic artery. The Wassermann reaction pointed toward the formation of an aneurism. It incited to special care, but could not be a reason for abstaining from operation.

Above the optic nerve a pulsating tumefaction could be felt; its form and course agreed with the location of the ophthalmic artery, and seemed to affirm that it was an aneurysm. Along the finger, a ligature was put before and behind with an aneurysm needle. The operation was done under local anesthesia. During manipulation a place of such slight resistance in the roof of the orbit was found, that an absorption thru the aneurysm seemed present.

During the first days after the operation somewhat more protrusion was present, considered as result of hemor-

rhage and reactive swelling. Large doses of potassium iodid were given, and after some months the protrusion had receded up to 4 mm. A radiogram showed the absorption that had been felt in the roof of the orbit. A year later she came back in bad condition; she was very weak and the protrusion had again increased. Albumin was found in the urine, and a circumscribed swelling of the left humerus was present; the diagnosis "multiple myelomata" was made. Death in the beginning of November. The autopsy showed the great extension of the myelomas. Within the cranium different ones were found, and at the roof of the orbit a large tumor-mass existed, which had eroded the bone. The vascularity of the tumor was sufficient to explain the observed pulsations.

**Intermittent Exophthalmos.**

ZEEMAN demonstrated a patient with intermittent exophthalmos, and the photographed displacements of the cornea under influence of different movements which hinder the venous flow. The cause of these orbital venous ectasias or varicoceles is yet unknown. Zeeman considers it not proven, and improbable, that the cause might be a narrowing of the jugular vein.

**Cyclodialysis and Trephining in Buphthalmos.**

W. P. C. ZEEMAN has performed 11 times cyclodialysis in five children. The first case was a decided success; but the results in the second, and third children were far less satisfactory, in spite of the fact that the operation was repeated in both eyes after a short but passing success, and of the third child the one eye was operated once and the second twice. Each of these children had important decompensation phenomena since birth, that is more than two years; and the condition was very unfavorable in spite of the use of pilocarpin since one half and one year respectively. In a fourth child the cyclodialysis made the cornea in the one eye clear and smooth; but a trephining of the sclera was necessary in the



other eye, on account of no improvement. In a fifth patient, where a trephining was done in the one eye with complete success, the other eye became decompensated in spite of two trephinings. A cyclodialysis produced at the end the wished for success, which has now lasted three years. V. = R. 1/60, L. 1/2, tension normal. In 11 cyclodialyses 3 times this result was reached. As far as clinically could be shown no damage was done by the operations.

Not satisfied with the above results, Zeeman performed trephining 11 times in 7 children. In three children the operation was done on both eyes, in the other 4 on one eye. A prolapse of the vitreous occurred during the operation twice. One was in a very large entirely blind eye, where ultimately it led to a slight decrease in size of the globe, which was an advantage cosmetically. It could perhaps have been prevented if after the small peripheral iridectomy, less handling had been done in making the toilet.

The second loss of vitreous occurred in a technically well executed case; the eye went to ruin. Twice a trephining was done in vain, both times on the same eye. This happened in a child, where one eye was operated with good success, but the operation failed on the other eye, and was repeated, also in vain. This eye had at the end normal tension after a cyclodialysis, and three years later the cornea and papilla showed that a sufficient normal equilibrium had been reached.

Eight operations (of the 11) were at first successful. In two, however, a complication has occurred. One was an 8-year-old boy, whose one eye was already long blind, and in his other only remained a small peripheric part of the visual field. Some time after the operation detachment of the retina occurred, which, altho remaining localized, had to be considered a very serious complication. The second case was a late infection, 5 years after the operation, serous hyalitis.

The retinal detachment seems to come from the continued and great lowering of the tension in the large and

already old eye. As retinal detachment is known to occur frequently in old buphthalmic eyes, such a free drainage as the trephining seems undesirable in a large eyeball, and especially in older cases of buphthalmos. Zeeman thinks that operation should only be considered in very young children; and that the menacing retinal detachment alone is reason to desist from any operation in older children, and only in case of high necessity perhaps can be thought of sclerotomies after Snellen and Vincentis.

Was the late infection preventable? Shortly after the trephining began its triumphant march, Straub modified the location of the connective tissue flap, parallel with and high above the corneal margin, which Elliot accepted in his second edition. His second modification was to prepare a thick conjunctival flap up to about 1.5 mm. above the corneal margin, and then a thin scleral flap until the corneal tissue shines thru; the conjunctival flap is thus strengthened with a thin scleral flap.

Undoubtedly, even less frequently than after Elliot's operation, a continuous drainage will be reached. But experience has shown that increase in tension is exceptional. Even if a renewed increase of tension should happen a little more often, and force another operative interference, it will be gladly accepted against the great advantage which the scleral flap gives against a late infection. The application of this principle finds difficulties in the thin buphthalmic wall, which, however, are not insurmountable. Such a flap formation of the sclera can be done after some experience in glaucoma of adults.

The vitreous prolapse could perhaps be evaded by replacing the trephining by a "scraping incision," as Professor Straub called it—an irregular cleavage of the sclera.

Some of the operated patients were shown; also two sisters suffering with buphthalmos, who had not yet been operated upon, who showed slow progress with good function; and an atrophy of the iris, which had progressed more in the older and seemed an ex-

ample of the aplasia of the iris, considered by Meller a causative factor in many cases of buphthalmos. However, in the younger child the same, but far less advanced change was found; and Zeeman believed that these are two stages of the same process, and that the iris atrophy is secondary.

**DISCUSSION.**—Rochat asked why Zeeman had given up the sclerotomies of Snellen. He has a few patients, on whom he performs them from time to time, each half year, or year, a sclerotomy, and is very well satisfied.

Zeeman replied that the trials to make the trephining less dangerous had led Straub to a sort of sclerotomy, the favorable result of which was shown in one of the patients. In communications about sclerotomies after Snellen he had not found an inducement to perform this operation.

Visser inquired about the size of the trephans, and asked if many small openings would not minimize the danger connected with trephining.

Snellen corroborated the bad prognosis in older cases and considered operation indicated for younger ones. However, he points out the probability of spontaneous cure, and the impossibility to foretell this.

Zeeman considered Visser's proposition worth considering; and replied to Snellen that he had shown two children of 6 and 8 years as examples of a favorable course without operation. But such a course could not have been expected, as not only the large size of the cornea and the high pressure, but also marked symptoms of decompensation (opacities, epiphora, etc.), had constantly been present.

Dubois objected much to the repeated sclerotomies, as defended by Rochat. He also experienced therewith complications, and did two trephinings with great satisfaction.

Tresling states, that in van der Hoeve's clinic peripheral iridectomy is much valued, which is combined with the sclerotomy.

Zeeman also testified to the value of peripheral iridectomy, which had been done in all his demonstrated cases, al-

tho it increased the danger of the operation somewhat.

### **Fixation for Objective Observation.**

A. VERWEY reminds us of the difficulty of looking at one point exactly, thru small motions of the eye and head, which are of different characters, have other sequences and must therefore be well distinguished. This is done most easily by a subjective method, described by Dodge in his excellent book "An Experimental Study of Visual Fixation." If one fixes a strongly illuminated triangle a short time to reproduce an after image, and if one then looks at a millimeter paper, it will be impossible to keep an angle of this after image on a distinct spot of the paper. Thru this "pseudonystagmus of fixation" great difficulties are encountered in the production of small after images.

The uncertainty of the fixation is clear and an objective method is necessary. The principal difficulty is to distinguish the head motions from those of the eye, or, more clearly stated, to find an objective measure for the unconscious deviations of the visual line, that is the determination of the size of the fixation field of the retina.

The cornea was looked at with Javal's ophthalmometer, when some calomel particles were on it. One can see the well known picture of the steps, and in front of it the calomel particles. As the distance between these two is 3.9 mm., a simultaneous sharp observation is impossible, so that even under the most favorable illumination it is difficult to observe a displacement of both points over one-fourth part off one step.

Verwey computed the influence of the sole eye turning, of the sole head turning, and of the sole head displacement, as well on the rotation of the visual line, as on the displacement of the particle on the cornea, and on the parallax of this particle along the corneal image. The result was that equality of the parallax of all three sorts of motion corresponds with a rather similar size of the rotation of the visual line. On the contrary, an equal devia-

tion of the corneal point, with the three different sorts of motion, belongs to a very unequal size of this parallax, and also to very large differences in the rotation angle of the visual line. It follows, therefore, that the observation of the parallax gives a good indication for the knowledge of this rotation, and not the observation of the rotation of the corneal point.

One-fourth part of one step of Javal's picture is the minimum which can be observed, which corresponds to an angle of 17 minutes. These 17 seconds correspond with a rotation of the visual line over 540 seconds, 574 seconds, and 529 seconds. Verwey found for different people with exact fixation a parallax of  $\frac{1}{4}$  to 1 step, so that a fixation nystagmus of 9 minutes to 36 minutes can be called physiologic. A photographic way of registration can refine this method, but only with complete sacrifice of the normal course of the motions and of the clinical usefulness.

The described method is also very useful for the objective observation of the movements of the visual line, while following a point in motion or following an unbroken line, or in counting points and stripes. The reflex for following a point in motion goes out from the periphery, not from the macula, according to experiments of Dodge. An interrupted movement seems only possible, when consciousness comes in play. According to Dodge "The real problems of psychologic optics are not so much connected with the mythical fixation point, as with the relation with each other of the surfaces with more or less distinct vision."

These conceptions have to be considered for all kinds of problems: For stereoscopic vision and the horizontal disparation, for determination of the blind spot and of scotoma, for positive induction and the irradiation, for the valuation of the localization of the retinal elements and the connection between tactile and visual space. The measuring could be of value perhaps for the practice with central scotomata, retrobulbar neuritis, and insular sclerosis.

DISCUSSION.—Weve stated that the enlarged ophthalmoscopic picture in the upright image seems to be useful for such observation.

Rochat said, that the touching with the gaze, as is seen in fixation, also is observed during accommodation.

Verwey agreed, that the interrupted visual motions can well be observed with the ophthalmoscope, but that the instrumentarium for more exact investigation would become very complicated.

#### Photography of the Background of the Eye.

J. K. A. WERTHEIM SALOMONSON read a paper that will be published elsewhere.

DISCUSSION.—Schoute asked about the normal reflexes of the eye and their disturbances. Wertheim Salomonson kept clear of these in the way first indicated by Gullstrand, by keeping clearly separated the illumination and the observation cones of light.

Wolff asked if a trial with color-photography had been made.

Wertheim Salomonson stated that this would necessitate a 40 times longer exposure and that this is not permissible.

Rochat described the method used by Hagen, where the illumination is secured thru the sclera, and which may be even simpler than the way just described.

#### The Smallest Differences of Direction Distinguishable with the Eye.

C. OTTO ROELOFS mentioned that Hering made a sharp distinction between the "resolving power" and the optical space sense. The first is determined by examination of the minimum separabile, the second by examination of the smallest differences of direction observable with the eye. Visual acuity and resolving power would mean the same. Roelofs had two objections, one of which he has published. (A. J. O., v. 1, p. 430.) He stated that the minimum separabile is a very vague conception and he considers it advisable to replace it by examination of the observation circle or the smallest observation breadth. The second objection relates to the comparison of

the visual acuity with the resolving power.

Roelofs wishes a sharp distinction between the examination for the smallest observation breadth, and that for the smallest observable difference in direction. It seems, however, very one sided to consider only the examination of the first, for the determination of the visual acuity. This alone does not determine the acuity of vision. Straub called visual acuity: The power to get acquainted with differences of direction thru the eye. Accepting this then the examination of the visual acuity involves: 1.—The examination of the observation circle and the smallest observation breadth; 2.—The examination of the optical space sense (better called direction sense).

Roelofs has investigated the optical direction sense. If two neighboring points are perceived, their direction does not coincide with the moment, when they are observed separately. It cannot be the smallest observable difference of direction, because the field between the two points is already observed in another direction from that of either point. Straub therefore considered that this smallest difference of direction was found, not when the two points are observed separately, but as soon as the points seen together impress one as a little bar. He proposed as the experimental object two squares, put together, that is, a bar twice as long as broad, as the most appropriate object for determination of the smallest observable difference of direction. The circumstances for such a determination must be as favorable as possible, and he doubted much if with such an object these were fulfilled.

He therefore used two sets of rods: (a) Bars of  $1/2$  mm.,  $2/3$  mm., up to  $9/10$  mm. Here the relation of length to breadth decreases constantly and nears 1. (b) Rods of  $1/2$  mm.,  $1/3$  mm., up to and with  $1/9$  mm. Here the relation of length to breadth constantly increases. The examination is done in a hall, 18 m. long with ordinary daylight with his emmetropic right eye. Someone else put up the cardboards, on which the rods were

made with India ink. Approaching the test, the longest distance was sought at which he could recognize the bar as such, and could indicate its direction.

It appeared soon, that before sure recognition he could recognize with probability the direction of the rod. It seems that the observation of the bar depends on the recognition of difference between length and breadth. If the angles are measured under which the length and breadth of the rod are seen, then the difference of these angles gives under the given circumstances the just observable difference of direction. With "certainty" no mistakes were made, with "probability" the number of mistakes was about 5 per cent. A minimum for the length of the bar was found of about 80 seconds with great probability, or of about 110 seconds with certainty. A maximum for length of course does not exist. Length to breadth were in relation of 2 to 1 for the shortest rod recognizable as such. The smallest breadth which is found is 17 seconds; this, however, is not yet the minimum.

The smallest breadth of a long line drawn with India ink is 2.5 to 3 seconds. If the line is still thinner, then Roelofs sees nothing. The minimum requirements found for recognizing a rod as such with great probability are: Smallest length about 60; smallest breadth about 3, smallest difference between length and breadth about 12 seconds.

If now a rod 80 seconds long and 68 seconds broad is taken, it cannot be recognized. The explanation must be found in the difference between the true length and breadth, and the observed or apparent length. The demands for a rod to be used as an experimental object in the examination of the smallest difference observable in direction, must be that in the first place the apparent length and breadth bear the same proportion as the true length and breadth. This is not fulfilled when astigmatism exists, nor when the breadth of the rod is smaller than the diameter of the observation circle. This last one is for the em-



metropic eye about 50 seconds. All rods thinner will therefore be apparently too broad and thus unfit for this examination. The breadth of a rod influences the perception of the length. In general, the larger breadth with small rods will favor a more just appreciation of length, and also reversely a greater length will give a more just appreciation of breadth. The apparent length will be relatively too small in such a case. We may therefore expect the most accurate results by using the broader rods. More investigations were made with other objects; a cross, broken line, etc. The observation of the difference in direction depends on different factors, as the form of the object, the size of the observation circle. With objects smaller than the observation circle we will never be able to find out the smallest observable difference in direction. The light sense is undoubtedly of great influence.

According to Roelofs the examination of the visual acuity ought to be divided into an investigation of the smallest observable difference of direction. Snellen's letters and similar optotypes may satisfy clinically, they are certainly not satisfactory for physiologic investigation, and the more accurate following up of changes in some pathologic cases. The principal aim of this communication was to determine experimentally the best methods for such examination. (This paper also appeared separately in the *Tydschr. v. Gen.*, June 15, 1918, with illustrations.)

**DISCUSSION.**—Wertheim Salomonson would produce the results differently. The number of observations accidentally guessed right, probably is as large as the number of mistakes. He would put the number of right observations = 100 lessened by the double number of wrong data.

Waardenburg asked if optical illusion while looking at the rods can surmount the vertical dimension.

Roelofs accepts with pleasure Wertheim Salomonson's suggestion. Differences in vertical and horizontal position can have hardly any influence on his numbers; neither can optical illusion have disturbed them.

Wertheim Salomonson asked if observation of a long thin line with a breadth of 3 seconds, may be compared with other results, where other retinal parts come into play.

Roelofs did not consider this observation of very great importance, in this investigation.

## CHICAGO OPHTHALMOLOGICAL SOCIETY.

DR. HEMAN H. BROWN, President, in the Chair.

Meeting of November 18th, 1918, postponed from October 21st, 1918, owing to the influenza epidemic.

### Superficial Punctate Keratitis.

DR. MICHAEL GOLDENBURG presented a case of superficial punctate keratitis in a girl, unmarried, age 25, book-keeper, who first came under his observation August 30th, 1916.

Previous personal history; has always been in perfect health except occasional symptoms of flatulency, and the eye trouble which started about six months ago. She does not know how this started, or what brought it on. She complained of pain in the eyes, sometimes very severe, photophobia, profuse lacrimation, and at times marked disturbance of vision so that she cannot work. Her vision at that time was, right 15/50; left 15/80.

Upon examination we found slight circumcorneal injection, conjunctival sacs filled with tears, pupils equal and regular and react well to light and accommodation. With oblique illumination one could see many small grayish elevations about 1 or 2 mm. in diameter scattered over the cornea. With the Coddington lens we found, in addition to these little elevations, many small grayish dots of about the same size that were perfectly flush with the normal cornea. The epithelium thruout was intact, retained its luster and did not stain. At no time has there been a tendency for these dots or elevations to join others and form larger ones, as we sometimes see in bullous keratitis.

This case has now been under my observation for over two years. I have seen these little elevations which come

in crops, always attended with pain of more or less intensity, disappear in five to ten days, leaving behind these little grayish dots and in another five or ten days they in turn disappear, leaving no recognizable sign of their previous presence. The crops at times come before the previous ones have entirely cleared up. At times there may be so many present that one cannot count them, and again there may be only four or five visible; they may appear in one or both eyes and at times alternately. For the past year she has been able to tell a few days in advance when a new crop was about to appear.

The disturbance of vision is entirely dependent upon whether these dots or elevations are in the pupillary area and the amount of lacrimation present. It is my belief that the pain is due to the formation of these little elevations, by which I mean that a fluid or cellular infiltrate appears anterior to Bowman's membrane, forcing forward the superficial epithelium, thus producing traction upon the delicate nerve filaments or corneal end organs: for as soon as these elevations have reached the maximum height the pain ceases and only the sense of roughness remains.

Every clinical examination and laboratory test has been made by competent internists, radiologists, rhinologists and odontologists: and all have reported negative findings. Every form of treatment known or suggested has been tried, i. e., rest by atropin, bandaging, bichlorid, and atropin ointment, subconjunctival injections, dietetic starvation, deep intramuscular injection of cacodylat of sodium, etc., but still these crops come and go. It is interesting to report that for the first seven or ten days that a new form of treatment is resorted to she would show improvement, then she would drop back again. She has during all this time also been under the care of a thoroly competent internist.

Her vision with a small minus correction can be improved to 15/20 in either eye when the cornea is sufficiently clear.

My object in presenting this case is not its rarity, but its stubborn response

to treatment, and in the hope that some one may cast some light on the apparent obscure etiology of this case and thus aid in its treatment.

DISCUSSION.—Dr. Tydings asked if it took the fluorescein stain.

Dr. Goldenburg said no. In superficial punctate keratitis it never stained. In herpetic keratitis you will have some staining; that is a point of differentiation.

Dr. Tydings suggests that we eliminate every possible source, particularly sinuses or tonsils. The patient in case of sinus trouble may have blebs come on fingers or back of hands. Wherever you have septic conditons you will almost always find trouble in sinuses or tonsils.

#### Spontaneous Hemorrhage into the Vitreous.

DR. H. W. WOODRUFF presented a case of spontaneous hemorrhage into the vitreous. The patient, G. V., age 20 years, came to the Illinois Charitable Eye and Ear Infirmary, April 28, 1918. He claimed to have lifted about 500 pounds and about two hours after was unable to see. Vision right eye, could count fingers at one foot; left eye, 15/200. Blood pressure systolic 110. Diastolic 80. Urine analysis negative. Wassermann negative. Tubercular test negative.

Treatment: Atropin in both eyes, pressure bandage. Internally, syrup ferric iodid, 30 min. three times a day. Hot applications. Referred to Nose and Throat Dept., tonsils were removed. Also given iodid of potash three times daily.

Discharged Aug. 25, 1918. Condition improved. Vision, right eye 20/30, left eye 20/100.

On November 2nd patient was admitted to the hospital stating that on October 25th he had lost the vision in the left eye almost immediately. No history of any strain. Vision, right eye 20/20. Left eye light perception.

Treatment: Hot applications. K. I. gr. 10. Atropin 1 per cent each t. i. d. November 18th, vision right eye 20/20, left eye 3/200.

Ophthalmoscopic examination shows extensive blood in the vitreous.

These cases are not so very rare. I have seen two of them in the past year. I had hoped that Dr. Faith would present his case of retinitis proliferans, as such a condition follows these hemorrhages.

The prognosis is not good on account of these recurrences and the consequent damage done to the vitreous.

I have just had another case at the Infirmary with a specific history. Retinitis proliferans in one eye and hemorrhage into the vitreous of the other eye. Had had so many salvarsan injections that we refrained from giving him antiluetic treatment. When these hemorrhages are repeated serious damage is the result.

DISCUSSION.—Dr. Tydings.—Did this case fail to recover?

Dr. Woodruff.—He recovered vision in the eye with the recent hemorrhage. I refer to the last case mentioned with specific etiology.

Dr. Mundt.—What was the fundus like when discharged?

Dr. Woodruff.—Retinitis proliferans in one eye. No sign of hemorrhage except some vitreous opacities, but normal vision.

Dr. Goldenburg.—Where do you suppose this hemorrhage came from? I believe many of them come from the ciliary vessels.

Dr. Woodruff.—I cannot say from what vessels the hemorrhage occurred.

Dr. H. H. Brown.—The case shown tonight by Dr. Woodruff is very interesting on account of the youth of the patient (20 years), and the lack of any history that would explain the etiology. There must be, however, some constitutional cause. Dr. Woodruff has made no statement as to family history. Was there anything in the family history?

Dr. Woodruff.—The family history was negative.

Dr. Goldenburg had a similar case in a woman apparently healthy, who originally presented herself with a unilateral neuroretinitis which eventually cleared up, although the etiology was never discovered and every test and examination had been resorted to. About six months later she suddenly ap-

peared with the statement that she had lost her vision in that eye the night before. She was taking a bath when, without any warning, everything became dark before this eye. Upon examination nothing was to be seen externally, pupil dilated, reflexes both direct and consensual present, ophthalmoscopic examination was impossible as we could produce no red reflex. The diagnosis of a hemorrhage in the vitreous chamber was made, probably from the ciliary body. A consultant concurred in diagnosis, but not in prognosis. She responded to antiluetic treatment pushed to the limit; this treatment gave the best results for her neuroretinitis previously. Vision when last seen in this eye was 20/30 with some floaters in the vitreous.

Dr. Tydings.—I do not think that the etiology of her retinitis is dependent on any other factor than toxins. I have seen it in diabetes. There are many cases which could not be diagnosed. It might be either diabetes or T. B., and yet it is not dependent on any one factor. Any toxin might give rise to hemorrhage conditions in the retina.

Dr. Von Der Heydt.—In connection with these vague, spontaneous hemorrhages I have two possibilities in mind, not as yet mentioned in this discussion. One is hemophilia, for the exclusion of which a coagulation test can be made. If in a case, the hemorrhages are monocular, one must bear in mind the possibility of malignancy.

Dr. Woodruff.—We have spontaneous hemorrhages in the conjunctiva which are exceedingly common. So far there is no explanation for this. It occurs in people with apparently perfect health. It makes a great deal of difference where the hemorrhage is. These hemorrhages in the case of the young man are quite different from those cases where you have definite symptoms of syphilis. Might it not be that whether this hemorrhage came from the ciliary body or the choroid, might there not be some congenital malformation in these vessels? Quite a number of cases have been reported. They occur

over and over again thru a period of years.

**Ophthalmoscopy with the Redfree Light of Vogt.**

DR. ROBERT VON DER HEYDT read a paper on this subject. See p. 122.

DISCUSSION.—Dr. Brown.—It is useless to say that a paper such as the one presented entails an enormous amount of work, and I know that I am voicing the sentiments of the Society when I say that we owe a great deal to the author for presenting this very interesting subject. I know that the doctor needs encouragement in this work. Are there any suggestions or questions?

Dr. Woodruff.—I have enjoyed this paper very much and have long been hoping for a light that I have always thought of as an artificial daylight. Occasionally in examining a fundus I have been able to utilize sunlight, and it is quite a revelation. There is a very different appearance of the fundus by daylight. It is important in making differential diagnosis in conditions of the nerveheads. I expect to see the day when we may have an artificial daylight.

Dr. Noble thought the Society was to be felicitated on having a member who is taking up this work. It had occurred to him that it would be a proper thing for the officers of the Society to get behind Dr. Von der Heydt and in some way aid him in perfecting it.

Dr. Mundt.—The subject discussed by Dr. Von der Heydt is very interesting and it seems that when he has finished the work we will have a diagnostic method of great value.

Regarding the subject raised by Dr. Woodruff of the desire for an artificial daylight. For well over a year I have used my perimeter in my dark room which is illuminated by a Day-Light Nitrogen lamp known as a C2 Day-Light lamp. Under this light colors are the same as in daylight and it has the one great advantage of being a constant illuminant. This lamp was introduced to the medical profession by Peter.

Dr. Smith.—Has the doctor investi-

gated if glass manufacturers know of any reason why chemical ingredients cannot be combined in glass, so that the trouble of having chambers containing the solutions would be eliminated?

Dr. Goldenburg.—An interesting phase would be the ability to trace the nerve fibers from the nervehead to the macula. I did not know these fibers ran beyond the macula. It would be exceedingly interesting in cases of retrobulbar neuritis.

Dr. Murray.—When I was inspecting a hospital in Pisa, Italy, in 1906, my attention was called to a small hole in the wall of the dark room, communicating with the outside. The doctor explained to me that it was their means of utilizing natural daylight for ophthalmoscopic examinations. The appearance of the fundus is certainly vastly different when using this source of illumination from what we are accustomed to, and it is easy to conceive that our ideas regarding fundus findings in general may be greatly changed when such a light as Dr. Von der Heydt describes has been adapted to practical use.

Dr. Von der Heydt.—(In closing.) Dr. Goldenburg has anticipated my next paper regarding optic neuritis. In cases of retrobulbar neuritis Vogt finds that the macula papillary bundles have disappeared. Regarding Dr. Woodruff's remarks pertaining to ophthalmoscopy by sunlight, this would be ideal for diagnosing optic nerve atrophy, as its qualities would be almost constant. With artificial light we may use one light now, and then another. Not alone may our sources of light vary in yellow, nerve heads in themselves are different—deep cuppings and plainly visible laminae cribrosa, also different degrees of capillary vascularization and tissue deposits, cause various degrees of white to yellowish normal discs. Again the lenses in our own eyes change as we grow older. Fifteen and twenty years ago a nervehead appeared whiter to us than it would today. The diagnosis of slight pallor of the disc will always remain a personal equation.



In answer to Dr. Smith, a glass cannot be constructed containing these chemical ingredients or it would have been made over there. They have been experimenting for years. The subject is quite complex. I have prepared all summer in order to be able to present this matter tonight.

ALFRED N. MURRAY, M. D.,  
Secretary.

### COLORADO OPHTHALMOLOGICAL SOCIETY.

DECEMBER 21, 1918

DR. C. E. WALKER, PRESIDING

October and November meetings were omitted on account of influenza epidemic.

#### Traumatic Staphyloma of Sclera.

H. R. STILWILL, DENVER, presented an Italian coal miner aged 23 years who, on stumbling in the dark, had fallen forward on his face, striking the right eye against the hard rubber handle of an electric machine. When seen two days later, there was hemorrhage in the anterior chamber, with crescentic bulging of the sclera above in the ciliary region. The cornea was intact, and the upper part of the iris had disappeared beneath the bulging sclera, the appearance being practically that of an iridectomy except that there were no angles to the pupil. The conjunctiva was not ruptured but was chemotic. The eyeball was soft and vision equal to light perception.

In a few days the fundus could be seen through the lens, which was not dislocated. The bulging of the sclera now measured 4 by 8 mm., with about 2 or 3 mm. of elevation. The bulging was dark blue in color, probably due to thinning of the sclera with the ciliary body and anterior portion of the choroid lying beneath. Vision with -2.00 sphere was 4/12. A moderate return of pain and redness of the eyeball, a few days previously, with slight tenderness to pressure, had been readily controlled by atropin and dionin.

DISCUSSION. Melville Black, Denver. It is interesting to speculate whether the large opening in the sclera will undergo cicatrization and closure. This eye might be regarded as an eye dangerous to its

fellow. Should operative procedures be instituted, or should future developments be awaited? It is difficult to know whether to open the eyeball and suture, or to await the slow disintegration that is likely to occur, with probable ultimate removal of the eyeball. The eye is not likely to recover much usefulness as a visual organ.

Edward Jackson, Denver. The case reminds me of cases of simple extraction with prolapse of the iris. In only one of my cases was the prolapse excised; and none of the cases gave any trouble. The condition in this case is probably somewhat more dangerous than prolapse after cataract extraction; but if the vision does not go down more the danger of sympathetic inflammation is probably small.

C. A. Ringle, Greeley, believed that such cases did better if left alone.

Otis Orendorf, Canon City, had seen a case similar to this one, in which the injury was also due to a fall. There was no conjunctival wound but a scleral bulging about the size of this one, with severe reaction. The eye was retained for three or four years, but the staphyloma became so disfiguring, being also accompanied by pain, that the patient, a young woman, asked to have the eye enucleated.

E. T. Boyd, Denver, believed from the position of the wound and the engagement of the iris that there would be a chronic uveal irritation which would result in phthisis bulbi.

George F. Libby, Denver, would advise expectant treatment.

H. R. Stilwill (closing). So far as the condition of the retina of this eye was concerned the man would probably have very good vision. Like Dr. Libby, he believed the eye should be watched. If it were his own eye he would hold on to it for a while.

#### Thromboses of Central Retinal Vessels.

H. R. STILWILL, Denver, presented a woman aged 57 years, who had consulted him on October 24th, 1918. In the previous August she had noticed a "cloud" which came suddenly before the right eye, and since that time had been able to see very little with the eye. There was no history of injury or inflammation.

The general health had always been good, and her physician had reported a blood pressure of 135 mm. of mercury, the urine negative and no indication of arteriosclerosis or cardiac disease. The ophthalmoscopic examination showed the entire fundus dotted with hemorrhagic patches. The nerve head was not swollen, but was in large part covered by exudate. The *veins* were dilated and tortuous and in places covered with extravasated blood. Those of the arteries which could be seen were extremely small and thread-like.

William H. Crisp, Denver, reported the case of a man 32 years, who had come in an hour and a half after becoming suddenly blind in the left eye. The patient was tuberculous, and was living in a tent. He stated that he had had a similar attack two months previously, lasting only a half hour, and followed by perfect recovery of vision. When he first came in the fundus of the right eye presented the very characteristic appearance of so-called embolism of the *central retinal artery*. The vessels were thread-like, there was a puffy pallor of the general fundus, and a cherry-red circular patch at the macula. This macular patch had later given place to an irregular brown spot. There had been no recovery of vision. The lesion in this case seemed likely a thrombosis. The heart was apparently normal.

DISCUSSION. George F. Libby, Denver, recalled a case of venous thrombosis which he had presented to the society some years previously. In this case the eye disturbances complicated a nephritis which was apparently due to a fourth of July drinking bout. This was 18 years ago and there had been no ocular or general disturbance since.

Melville Black, Denver. Dr. Stilwill's case was a beautifully typical one of what was formerly called apoplexy of the retina. These cases should not be confused with the arterial cases.

Edward Jackson, Denver, believed that he had not seen quite so many venous as arterial cases; and he had seen more venous cases involving branches than of the central vein.

### Orbital Periostitis and Abscess from Trauma.

JOHN A. McCaw, Denver, presented a boy, aged 15 years, who two years previously had been thrown from a truck, striking his nose and left eye on the cobblestones. Two weeks ago a swelling had appeared over the left eye, about midway between the internal and external canthi and a little below the upper rim of the orbit. The swelling, which was tender to touch, had varied somewhat in size, but at the time of showing the patient there was a distinct increase in volume, and fluctuation could be detected. The upper margin of the orbit was tender. (Puncture of the swelling, with a hollow needle, after the date of the meeting, revealed the presence of pus, and of a disturbance of the periosteum.)

DISCUSSION. Melville Black, Denver, suggested that it would be simple and advantageous to introduce a hypodermic needle into the swelling and aspirate some of the contents. If the condition was an inflammatory one the mass should be opened and drained. If it was a lacrimal tumor it might subside of its own accord.

W. C. Bane, Denver, described a case of multiple swellings below the right external ear and in the throat of a boy of 13 years, with involvement of the cervical glands, and subsequent appearance of a nodular mass near the outer canthus of the right eye. Examination of a gland from the neck disclosed a large-round-cell sarcoma.

H. R. Stilwill, Denver, thought that the growth in Dr. McCaw's case would probably be hard if it were malignant.

Edward Jackson, Denver, thought that there was some thickening of the periosteum around the swelling. He thought it likely that the bone was diseased as a result of the injury, even tho the swelling was not due to trouble in the frontal sinus.

### Nodular Opacities of Cornea.

JOHN A. McCaw, Denver, presented a woman aged 43 years, who had come to the clinic six weeks previously complaining of fairly recent loss of vision in the left eye. The history was negative and there was nothing to point to syphi-

lis. There was no inflammatory reaction in the eye. The examination of the cornea with the corneal microscope revealed fifteen or twenty fine white spots in the substantia propria.

DISCUSSION. Edward Jackson, Denver. There had at no time been any appearance of inflammation in the eye, either superficially or deeply. Under magnification, the spots had very much the appearance of the usual spots on Descemet's membrane. They were probably well forward in the substance of the cornea. The case seemed more or less of the character of nodular keratitis or nodular opacity, such as came on rather well along in life. There were no lines such as would give it the character of grill-like keratitis. The condition was more probably tuberculous than syphilitic in origin.

#### Optic Neuritis.

MELVILLE BLACK, Denver, presented a man, aged 29 years, a barber by trade, who four weeks previously had gone suddenly blind in the left eye. The history was negative as to injury or infection. A Wassermann test was positive 4. There was a rather typical choked disc, without noticeable hemorrhages.

W. C. Bane, Denver, presented a married woman of 54 years, the vision of whose left eye had become dim one week before she was first seen on November 25th. The vision of the affected eye was reduced to 5-30ths. There had been dull pain behind this eye and a feeling of heaviness in it, and the eye appeared to project slightly beyond its fellow, altho the exophthalmometer revealed less than a millimeter of exophthalmos. The right fundus was normal. The left disc was moderately swollen and its edges indistinct. The vision of the left eye on November 27th was of the hand as an object, and on November 30th almost nil. The swelling of the disc gradually increased, reaching three diopters by December 2nd, on which date there were some linear hemorrhages, and the pain about the eye was so severe as to interfere with sleep. The urinary test and x-ray examination of the sinuses were negative. On December 12th six teeth, found to be diseased, were ex-

tracted, considerable hemorrhage following. On December 16th the pain was very much diminished and the swelling of the disc decidedly reduced. On December 21st the swelling of the disc was almost gone but the vision was nil.

George F. Libby, Denver, reported a case of binocular optic neuritis in a woman of about 40 years, apparently due to alveolar focal infection associated with nasal blocking. The patient had stated that on May 25th, 1918, there was sudden loss of vision in each eye, the right quickly recovering its sight but not the left. Dr. J. R. Arneill found the physical examinations negative. Treatment of indicanuria and a two months' rest were followed by restoration of normal vision. Then occurred an acute rhinitis, when vision dropped nearly to the low point of two months previously. With subsidence of the rhinitis the vision again became normal. Soon after this a devitalized tooth containing a bit of broken dental instrument was extracted upon Dr. Melville Black's advice, and streptococcus was found in culture. X-ray pictures of this and seven other devitalized teeth showed no suspicion of alveolar blind abscess. Dr. T. J. Gallaher found a deflection of the nasal septum to the left, with pressure contact. Dr. Libby, to whom the case was referred for ophthalmic examination on September 10th, found the disc margins obscure and the nerve heads hyperemic and slightly swollen. Vision R. was 5-5ths mostly, L. 5-5th partly. A submucous resection of the nasal septum was done by Dr. Gallaher on September 11th. On October 4th the disc margins were sharper and the hyperemia gone. The vision was 5-3rds mostly in each eye, but asthenopia still persisted, although not a previously noted scotoma. On October 19th the seven devitalized teeth were extracted and two of them showed streptococcus viridans abscesses. On December 6, 1918, the nerve heads were normal, although, like those of the patient's son and mother, not so well defined as the average disc; and the vision was still 5-3rds mostly, with tolerance of close work.

DISCUSSION. Melville Black, Denver, thought that the blindness or almost ab-

solite blindness in the first two cases, out of proportion to the amount of swelling of the discs, suggested that the cause for obstruction of the circulation was well forward; as contrasted with cases of bilateral choking of the discs from cerebral gumma, in which the reduction of vision was often slight. In the case reported by Dr. Libby, he had unsuccessfully advised the extraction of teeth on account of the finding of streptococcus viridans in the one previously extracted.

George F. Libby, Denver, referring to an impression that Dr. Bane thought the benefit from the extraction of the teeth perhaps largely due to the bleeding, said he believed that a purely depletive benefit from bleeding was temporary, and that permanent benefit meant removal of toxins. He felt that his own case was probably one of toxic neuritis.

Edward Jackson, Denver, referred to a case recently reported in which the eye was entirely blind, and it was suggested that the nose should be operated upon. But this action was delayed, and in a few days the other eye went blind, and both eyes subsequently developed complete optic atrophy. Dr. Jackson felt that in the case referred to the patient might not have had the misfortune to become blind in both eyes if the nose had been freely opened up. Dr. Libby's patient might have had a very thin or dehiscent wall, so that congestion in the sinus would soon involve the optic nerve.

#### Corneal and Uveal Tuberculosis.

W. C. BANE, Denver, presented a colored woman, aged 28 years, in the lower third of the cornea of whose right eye were four "mutton fat" deposits, varying from one-third to one-half mm. in diameter. There was a similar deposit in the lower angle of the anterior chamber, and the whole cornea was moderately steamy. On November, 1919, the vision of this eye was fingers at 15 inches, that of the other 5-5ths. There was slight circumcorneal injection, the pupil measured 4 mm. in diameter and was inactive, and the tension of the eye was 28 mm. of mercury. No view of the fundus was obtainable. There was no history of tuberculosis, but the patient had come to Colorado 15 months previously and had

lost weight since doing so. The Wassermann test and the complement fixation test for tuberculosis were both negative. Instillation of atropin rather rapidly produced acute glaucomatous pain and tension with complete loss of vision, and, in spite of partial relief from the use of eserine and acetylsalicylic acid the tension had remained about 52 mm. of mercury. Within the past ten days one mg. of T. R. had produced a positive reaction, and a rise in temperature to 100 degrees F. in the afternoon, but no local reaction. The high frequency current had proved soothing to the eye.

DISCUSSION. Edward Jackson, Denver, had seen rises of intraocular tension in connection with other cases of tuberculosis uveitis. From a somewhat limited experience of such cases he would say that there was a decided tendency in this direction. An operation in this case should not be hastily undertaken. If the original process subsided the tension was also likely to come down. The fact that there was no focal reaction rather suggested a focus of tuberculosis elsewhere.

Dr. Bane doubted the wisdom of any operative measures in the case, in the presence of probable tuberculosis.

C. E. Walker, Denver, had operated in the presence of tuberculous conditions and had seen no difference in the healing process after such operations, as compared with other cases. If no result was being obtained in bringing down the tension of the eye, he would certainly consider an iridectomy. He had done an iridectomy in several eyes which he believed to be tuberculous.

Melville Black, Denver, objected to doing either an iridectomy or a trephining in such case on account of the risk of hemorrhage.

#### Puncture Wounds of Crystalline Lens.

E. T. BOYD, Denver, presented two patients, each of whom had suffered a penetrating injury involving the cornea, iris, and lens. A youth of 19 years was struck in the left eye by a dressmaker's pin thrown by another youth from a distance of about ten feet. The cornea was penetrated a little outside the pupillary margin in the lower outer quadrant, the



pin passing also thru the iris into the lens. When the patient was seen one hour after the injury, the anterior chamber was full of soft lens matter and the iris was in contact with the wound. The use of atropin relieved the synechia in about two days, the lens matter was rapidly absorbed, and the eye became quiet. A man of 29 years who was driving an ax on to its handle was struck in the right eye with a splinter of wood from the timber on which he was pounding; the injury affecting the cornea, iris, and lens in much the same way and location as in the first case; and in this case also the anterior chamber was rapidly filled with soft lens matter and the iris was adherent to the wound. Here again, the synechia was relieved by the use of atropin, and, at the time of the demonstration, the lens substance was steadily being absorbed and the eye becoming quiet.

#### Traumatic Conical Cornea.

WILLIAM H. CRISP, Denver, presented a boy, aged 12 years who, on the 11th of December had been struck on the left eye by an unknown foreign body while driving a wagon. The only two suggestions obtainable as to the source of the blow on the eye were first that something might have exploded in an ash wagon which was approaching at the time, and second that some boys not far off might have fired a toy rifle. The blow was a very severe one, and the boy was in a mild condition of shock when he came to the office one hour and a half after the injury. The epithelium of the lower inner fourth of the left cornea was much lacerated, and there was a central circular area of complete stripping of the epithelium, suggesting that the foreign body, whatever its character, might have come from the left, struck the center of the cornea and then glanced along the cornea toward the nasal side. The morning after the injury it was noticeable that the whole depth of the cornea between the nasal side and a little to this side of the centre was bulging considerably in the form of a flattened cone. There was a severe general reaction. As healing developed, the only staining was along two irregular lines roughly at right angles with one another, extending

across the bulging area. No other part of the eye showed traces of the injury. Vision of this eye was 5-60ths, and no attempt had so far been made to find a correcting lens. The tension of the eye was slightly subnormal.

DISCUSSION.—W. C. Bane, Denver, and C. E. Walker, Denver, suggested the use of a pressure bandage to reduce the bulging.

Edward Jackson, Denver, thought a pressure bandage would not do any particular good, but would tend toward softening of the tissues if it were worn for some time. He had seen a case treated with a compress for months do better after the compression was left off. After the inflammatory reaction had subsided, pilocarpin or eserine might be of some advantage.

Otis M. Orendorff, Canon City, referred to a case in which there had been apparent softening from the use of a compression bandage, and furthermore the patient would not wear the bandage on account of pain.

Dr. Crisp believed that, on account of the spherical shape of the eyeball and the hydrostatic distribution of any pressure applied to it, and further in view of the fact that it was impossible to insure a fixed position of the eyeball under the bandage, such a bandage could produce no benefit and might be harmful by producing an effect exactly opposite to that desired.

Dr. Walker argued that if a compress were used both eyes should be treated in the same way, so that motion of the eyeball would be restricted.

#### Postdiphtheric Paralysis.

JAMES J. PATTEE, Pueblo, reported a case of postdiphtheric paralysis in a woman of 36 years. Antitoxin had been used. The paralysis developed a little over two weeks after the onset of the diphtheria, which had continued for about ten days. There was weakness of the limbs, and definite paralysis of the soft palate and of the intrinsic muscles of the eyes. The vision improved much more rapidly than the throat condition, and she still complained of inability to force food down the lower part of the esophagus.

**DISCUSSION.** Edward Jackson, Denver, had personally experienced complete paralysis of accommodation after diphtheria. Recovery was complete within six weeks. Throat paralysis was noticeable as soon as the soreness of the throat

was over, and it was two years before he could swallow fluids with complete certainty and confidence, and six months before he entirely overcame the paralysis involving the limbs.

WILLIAM H. CRISP, M. D., Secretary.

## ABSTRACTS

**Roy, J. N., Vision among the Blacks of Africa.** *Ann. d'Ocul.*, 1918, v. 155, p. 513.

Roy examined about 5,000 negroes belonging to 22 different colonies, from an anatomic, physiologic and pathologic standpoint. He has observed that in the same individual, the vision was better in the tropics than in the temperate zones; so that normal vision in the tropics should be regarded as 7/5, rather than 5/5 or even 6/5. The Africans of the coast, especially the northern and northeastern sections, have come in contact with other races, especially the Arabs and Egyptians, and have suffered from diseases acquired thru this contact, such as variola, purulent ophthalmia, trachoma, and syphilis. From this it results that the Africans of the North show eye diseases much more frequently than those of the South, the latter having contracted them from those of the North.

The abundance of pigment in the eyes of the negro is very striking; sometimes the choroid, iris and ocular conjunctiva, especially near the outer canthus, seem to be almost saturated with it. Some negroes also show physiologic melanosis of the velum palati and gums.

The refraction is almost always emmetropic, except where pathologic changes have altered the corneal curvature. Myopia is found in 1.5 per cent of the population and always of very low degree; never more than 4. D., and then in albinos. Albinism is very common, but it was not found that albinos intermarry. There was about the same percentage of myopic astigmatism, while hyperopia and hyperopic astig-

matism were found each in about 2.5 per cent of cases, but never of a high degree. Compound astigmatism was occasionally found, especially in albinos, but never mixed or irregular astigmatism, except, of course, as the result of keratitis. The refractive errors are somewhat more numerous in the regions where schools have been established for a long time for educating the negroes.

When either the convex or concave glasses were required, a vision of 9/5 to 11/5 was often obtained. The best vision obtained in an emmetrope was 20/5, in a patient with "sleeping sickness." The average visual acuity of negro emmetropes is 12/5. They are able, when diving, to see at great depths. Changes in color sense and hemianopsias are never seen. Experiments showed the negroes see at night two to four times better than do the whites, probably due to the former's more frequently being in the dark. No anatomic basis so far as preponderance of rods, such as is found in night animals, was observed.

An interesting table is given of 50 observations, on negroes of various tribes between 13 and 30 years of age, dealing with the vision and the accommodation. The latter was anywhere from 1 D. to 3 D. greater than at the corresponding age in the white race. It would seem that with the development of the brain in the higher races goes a corresponding deterioration of the sense organs, especially those of sight and hearing, due probably to the manner of life, use of artificial lights, inherited diatheses, alimentation, study, prolonged use of the eye, etc.

C. L.

**Moreau, F., Disturbances of Macular Vision Caused by Traumatic Lesions of the Occipital Region.**—*Ann. d'Ocul.*, 1918, v. 155, p. 357.

Since vision consists not only in recognition of the existence of a point or line, but also in determining its movements, distance, depth, etc., these factors should be investigated in hemianopsia as well as the determination of the losses in the field. That is, in the ordinary visual fields there are zones of orientation, distinction, and precision, in passing from the periphery to the center. By the use of a stereoscope with Haitz' or Joseph's charts these zones can be determined. Different letters of the same size are used, instead of points or squares, and the places where these are recognized are joined into a zone of "distinction." The examination must be frequently interrupted to avoid the antagonism of the visual field. The central vision is tested by means of Holmes' or Pigeon's

stereoscope provided with special test objects, consisting of 6-rayed stars, either white on black background, or black on a white background. If the largest is seen complete, the area of central vision is normal. If branches or part of the nucleus is obscured, smaller ones are tried until one is found which is seen complete. Three case reports with interesting representations of the visual fields are given.

General Results of Visual Troubles in Hemianopsia with Central Lesion. (a) Reading.—There is an irregular rythm of reading by hemianopes different from the uncertainty of the amblyope. It is more difficult for them to read writing than printing, and unfamiliar than familiar texts. (b) Writing.—On unruled paper, the right hemianope has much more trouble than the left. On ruled the difference is not so great. In the former, the lines slant downward.

C. L.

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## HEAT IN THE TREATMENT OF CORNEAL ULCERS.

From the first use of the actual cautery in the treatment of wounds down to the days of Pasteur and aseptic surgery, heat has been a reliable means of destroying infection. Increased knowledge of pathology and the recognition of pathogenic organisms have enabled us to apply it more exactly and effectively. But from the time when the cautery was first used to check supuration, the problem has been to do this completely with the least damage to the invaded tissue.

Since Martinache described his use of the actual cautery to check the progress of a corneal ulcer over 45 years ago, many instruments for such application of heat to the cornea have been employed, from the steel knitting needle held in an alcohol flame, or the copper ball to hold the heat with a projecting point to touch the ulcer, to the numerous forms of galvanic cautery tip mounted on handles of varied weight and convenience.

In 1892, Lippincott reported his fa-

vorable experience in the use of hot water dropped on certain corneal ulcers. He advised heating the water to 160° F., or over, and dropping it directly on the ulcerated surface.

In 1899, Bourgeois called attention to the sterilization of corneal ulcers by blowing hot air upon them. He used a bent metal tube attached to a rubber bulb, similar to those used by dentists to dry cavities preparatory to filling. The tube is held in the flame of an alcohol lamp and the air drawn back and forth in the tube three or four times and then immediately expelled against the surface of the ulcer, which at once becomes white. The process can be repeated as often as necessary.

Eleven years later he reported, that depending wholly on this method for the sterilization of infected corneal ulcers, his results were truly remarkable. Rozet reported a similarly favorable experience with the method; but it seems not to have been widely practiced. The cauterization by live steam which has been used in the frontal sinus by Dennis, seems not to have been tried for corneal ulcers. Boiling alco-



hol and other fluids that might furnish a perfectly definite temperature are also untried.

In 1910 Weekers published his method of applying heat to the cornea by holding the cautery point as close as possible to the ulcer without actually touching it. He first used an olive shaped cautery, in the manner afterwards described by Prince under the name of Pasteurization. But Weekers soon substituted the galvanocautery tip as the source of heat, pointing out that the temperature required for sterilization was about 65° C, or 150° F.; and that the needed color and proximity of the cautery tip to develop and sustain such a heat could be readily learned by holding the tip close to the bulb of a mercurial thermometer.

Lastly Shahan worked out his thermophore by which the metal tip, heated to a known required temperature, could be held in contact with the surface of the ulcer for the necessary time, one minute; making the application of heat more exact than had heretofore been possible.

To check a corneal infection it is not necessary to boil or char the organisms. It is only essential to raise them to such a temperature as will destroy their power of multiplication; and the temperature that will effect this is one that will not in the required time do any great damage to the cornea itself. The most important service that Weekers has rendered in this matter is his experimental showing of how little damage need be done to corneal tissue, by heat that will sterilize the pathogenic organisms. (See p. 90.)

The final determination of the best means of applying the desirable degree of heat, must await a considerable experience with the different methods on the part of the profession in general. The hot air method of Bourgeois is extremely simple and easily applied and repeated. But on account of the greater penetrating power of radiant heat, the methods of Shahan, and Bourgeois seem more likely to reach and render innocuous the more deeply seated organisms.

The treatment of corneal infections by heat will become more exact and its results more satisfactory in proportion as it is carried on with a clear understanding of exactly how much heat is needed and how much is being applied.

E. J.

### THE RADICAL CURE OF DACRY-OCYSTITIS.

Chronic lacrimal sac disease is the *bête noir* of the Ophthalmic Surgeon, provided that he goes not at its cure by radical removal of the apparatus,—the last resort and to which nearly all cases should come.

True it is, that a certain proportion seem to recover after the nasal disease, particularly concomitant sinus affections, have been eliminated; and a few are cured by drainage with injections.

We have our choice of several radical methods of obliterating the sac:

1. The rhinolacrimal method of West and modifications, the intranasal operation; a somewhat difficult procedure largely advocated by the rhinologists.

2. Obliteration of the sac by caustics, recently resurrected by Gifford, who claims good and quick results from trichloracetic acid. The writer's small experience with nitric acid in the old days and with trichloracetic acid recently, has been that it is painful, causing edema and slow healing with prolonged after treatment.

3. Excision of the sac, preferably after the method of Meller, under local anesthesia by novocainadrenalin, when made by a master is one of the prettiest of all operations, and one in which the writer's experience gives full satisfaction.

Compensatory lessened secretion of mucous and lacrimal fluids certainly obtains after obliteration of the lacrimal canals; so that, except upon exposure to irritants as dust or smoke or winds that would make any eyes water, such patients do not generally complain of tearing, and in fact obtain relief from their watery eyes.

H. V. W.

## BOOK NOTICES.

**Transactions of the Ophthalmological Society of the United Kingdom,** Vol. 38, 384 pp., 56 ill., 9 pl. London, J. and A. Churchill, 1918.

The striking characteristic of this volume as compared with its predecessors in the series are well set forth in the Presidential Address of E. Treacher Collins in these words:

"You will have noticed that this volume has, like so many of us as an outcome of the war, had to tighten its belt. It is considerably reduced in bulk, due to the thinness of the paper. I am, however, pleased to say it is only superfluous matter with which it has had to dispense, the number of its pages and the amount of interest in its material being well up to the average."

An evidence of the "tightening of the belt," which is to be regretted, is the absence of any colored plates such as have added much to the value of former volumes. But in the number, interest, and importance of the papers presented, this volume is one of the best that this great society has published. As in former years, the papers are grouped under their appropriate heads as "Diseases of the Cornea," "Diseases of the Uveal Tract," etc. There are two symposia, each including several important papers, one on "Contagious Diseases of the Conjunctiva," the other on "Plastic Operations of the Eyelids."

However, despite its accustomed appearance, this volume marks a change in the life of the society of tremendous importance to it, and to ophthalmologists thruout the world. On its title page appear after "Transactions of the Ophthalmological Society of the United Kingdom," these added words, "With which are affiliated the Egyptian Ophthalmological Society, Midland Ophthalmological Society, North of England Ophthalmological Society, Oxford Ophthalmological Congress." And in the appendices are included five papers read before the Oxford Ophthalmological Congress and three from the Midland Ophthalmological Society.

This reaching out to coördinate the scientific work of the ophthalmologists of the British Empire is directly in the line of progress; and for an organization whose members reside in every quarter of the globe, cannot fail to react strongly and favorably on the life of the parent organization. It is significant that among the visitors contributing to these transactions are some well known American ophthalmic writers and workers. To have place in such a volume may well be regarded as an honor; and these men have thoroughly deserved it.

More than ever should these transactions be generally found in the libraries of all English reading ophthalmologists. There is no literature relating to ophthalmology of greater permanent value.

E. J.

**The Surgery of Oral Diseases and Malformations; Their Diagnosis and Treatment.** George van Ingen Brown, D. D. S., M. D., C. M., F. A. C. S. Third edition. 734 pages, with 570 engravings and 20 plates, and a selected list of examination questions. Lea and Febiger, Philadelphia and New York, 1918. Price \$7.00.

This book contains more than indicated by the title, as it is not only a complete treatise on oral diseases, but also a work of reference touching all medical interests in their oral relations. Thus the first chapter presents an excellent discourse on anesthesia and anesthetics, general and local, their methods of administration and their dangers; on hemorrhage and its treatment; and on shock. Other chapters deal with infection, fever, tetanus, tuberculosis, syphilis, etc., considering in detail diagnostic methods and treatment, diseases of the nervous system affecting the buccal region, nasal deformities and diseases in relation to the maxillae, diseases of the maxillary sinus, of the bone, glands, tumors, etc.

The special subjects are discussed in the sections on diseases of the mucous membrane of the mouth, and on hare-

lip, cleft palate, and defects of speech. These represent the chief part of the author's life work, and their discussion is based upon his extended experience in that line. All important pathologic conditions affecting, or influenced by, the buccal cavity and its immediate surroundings are entered upon, and the operative procedures are clearly described. A great portion of the illustrations are original and representations of the author's cases.

The most important change in this new edition is the chapter on war surgery in which the author gathered representative ideas and methods published from the work of the hospitals of practically all the principal belligerent nations.

The subject matter is very well systematized, and orientation is greatly facilitated by the use of heavy type for the headings of the different paragraphs. From the broadness of conception in which this valuable book is written, it will be read with great interest and benefit by every physician.

C. Z.

### BIOGRAPHIC SKETCHES

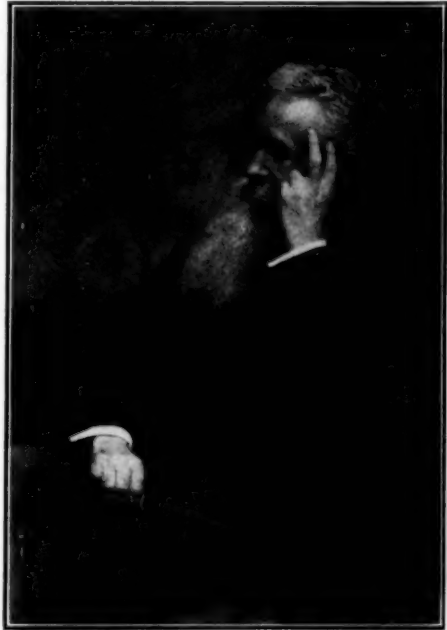
T. H. SHASTID, M. D.

SUPERIOR, WISCONSIN.

FREDERICK EUSTACE BATTEN was a well known London ophthalmologist, especially renowned for his researches in familial diseases of the eye. Born at Plymouth, England, in 1866, third son of the late John Winterbotham Batten, K. C., he received his training in the liberal arts at Westminster and at Trinity College, Cambridge; and his medical education at St. Bartholomew's Hospital, London. He was a member of the Council of the Ophthalmological Society of the United Kingdom from 1904-'06 and Secretary from 1906-'09. His death occurred suddenly on July 27, 1918.

JOHN COUPER.—A celebrated London ophthalmologist, specially renowned as diagnostician and teacher, was born at Glasgow, Scotland, Nov. 7, 1835, son of John and Charlotte Tennant Couper. He received the M. D. at Glasgow in

1856, and the F. R. C. S., England (exam.), in 1861. Settling down in London, he was, for a time, assistant surgeon and demonstrator of anatomy at the London Hospital. From 1869 to 1889 he was surgeon in the same institution, as well as lecturer on surgery. He was also, for a number of years, surgeon, afterwards consulting surgeon to the Royal London Ophthalmic Hospital and to the Scottish Hospital. He was a Fellow of the Hunterian and Harveian Societies. Among his more



John Couper, 1838-1918

important contributions are: "The Diagnosis of Astigmatism by the Ophthalmoscope" (B. M. A. Newcastle, 1890); and "A New Magazine Ophthalmoscope" (Trans. Oph. Soc. of U. K., 1883).

Celebrated ophthalmologist as he was, Dr. Couper at no time in his life wholly gave up general surgery.

In 1868 Dr. Couper married Helen Campbell, of Otter, Argyllshire, with whom he would have celebrated his golden wedding in Oct., 1918, had not his death intervened. He died at Falmouth, England, April 30, 1918.

Regarding the personality of Dr. Couper, a friend has written in a private letter as follows: "John Couper loved his work, and the only distinction he aimed at was to do his very best in it. Those who have learned from him, and worked with him, say he was 'a born teacher'—'a fine general surgeon' as well as 'a singularly able and intelligent eye surgeon.' With 'a remarkably clear, sound mind,' he was 'simple and transparent,' absolutely unassuming, and keen to learn as well as to teach. He had a warm appreciation of other men's good work, and rejoiced in their successes and distinctions. By patients and friends he was greatly loved and respected and regretted."

The following appreciation from the pen of Sir Anderson Critchett appears in "The British Journal of Ophthalmology," Vol. II, No. 7, at p. 396: "Ophthalmoscopic work always had a great attraction for Couper, especially the estimation of errors of refraction by the direct method—retinoscopy was then unknown—and in his desire for increased power of dealing with the minutiae of such cases he armed himself with specially constructed ophthalmoscopes which contained numerous lenses. His most favorite implement finally took the shape and proportions of a carpenter's rule which, following the custom of that workman, he usually carried in his trousers pocket.

"As he was unable to emulate the example of Sir Boyle Roche's famous bird and to be in two places at one and the same time, it naturally followed that as soon as he considered his senior clinicals to be capable of dealing with the routine of the outpatients' department he entrusted them with a large share of that work. My colleagues and I took full advantage of these golden opportunities, tho we sometimes had to drag our reluctant chief from the dark room when some new case involving special knowledge and experience proved too responsible for us to essay.

"Couper was one of the first to recognize and to point out the excellent results which often followed the correction of very slight refractive errors, especially in cases of astigmatism; and

he calmly pursued his way in that direction without heeding the gentle ridicule which Donders was at that time inclined to cast upon it. He made frequent use of atropin in refraction cases, and he preferred to give the full correction for myopia. I believe I am right in stating that he continued to the end to work with Paris inches; and his special box of lenses contained glasses worked in weird and complicated fractions, which would have been a terror to anybody but himself.

"Couper was an exceptionally good operator, possessing full command of very dextrous hands, and his only fault was a tendency to linger too long over the toilet of the eye after cataract extraction. In these days of cocain this might perhaps be accounted a virtue; but when anesthetics were almost always administered, the habit occasionally resulted in serious disadvantage. Like Noyes, of New York, he preferred an extremely narrow Graefe knife; and, unlike Swanzy, he made a large iridectomy."

The following, from Sir John Tweedy, appears at p. 399 of the same number of the same journal: "Altho a good surgeon and a skilled operator, his qualities were those of an ophthalmic physician. *Facile princeps* among the ophthalmoscopists of the day, he was one of the first in this country seriously and scientifically to study problems of the errors of refraction, and especially of astigmatism. His diagnostic skill and his careful method of investigation attracted a body of thoughtful pupils, not a few of whom afterwards attained to notable distinction.

"His mental temperament was essentially skeptical. Not unbelief; not misbelief; but hardness of belief was his intellectual attitude to all surgical and scientific questions. He did not believe easily or lightly, but only when convinced by the force of reason and by the potency of well observed facts. This skepticism may not have been an unmixed benefit as a teacher to beginners, but it was a real advantage at a hospital like Moorfields, where many



of the pupils, assistants, and visitors were actual or potential experts. . . .

"Couper was indeed a lovable man, a true friend, a staunch and loyal colleague. To have known him and to have been so long associated with him is an abiding satisfaction, and the recollection of a friendship unclouded thruout many years is a precious possession."

CARL CALVIN CULVER was a well known ophthalmologist and otolaryngologist of Burlington, Kansas. Born in Woodson County, Kans., July 5, 1887, he received the medical degree in 1911 at the University of Kansas Medical School. On July 5, 1911, he married Miss Pearl Muender, and then settled as ophthalmologist and otolaryngologist in Burlington, where he practiced until his death. He joined the army service in August, 1917, with the rank of lieutenant, and died in camp, Oct. 8, 1918.

CHARLES HUFF DAVIS. This well known ophthalmologist and otolaryngologist was born at Lebanon, Va., Aug. 25, 1875, son of Mr. and Mrs. John Lynch Davis. His training in the arts and sciences was received at the University of Tennessee. For a time he was a reporter on "The Knoxville Sentinel." Turning his attention to medicine, he received the medical degree at the Lincoln Memorial University, Knoxville, Tenn., in 1898.

He at once proceeded to study the eye, ear, nose and throat in Chicago, where he was appointed senior interne in the Illinois Charitable Eye and Ear Infirmary. But shortly afterward he returned to Knoxville, where he practiced as ophthalmologist and otolaryngologist. He was specialist for the Southern and the Louisville and Nashville railways, and for the Aluminum Company of America, at Marysville, and for The American Zinc Company of Tennessee, at Mascot. He was a Fellow of the American Medical Association, the American College of Surgeons, the American Laryngological Society, and a number of similar bodies.

Dr. Davis married, on June 25, 1900, Hortense Burton. There were no chil-

dren. He was a man of high moral character and a skillful ophthalmologist. Of medium height and build, he wore no beard, had a very dark complexion, bright hazel eyes, and dark brown hair sprinkled with gray. He was gay and brisk in manner, very genial, a lover of animals, a patriotic citizen, a Mason, a member of the Methodist church.

Dr. Davis died at his home, 1404 Laurel avenue, on Oct. 21, 1918, from pneumonia following influenza.

J. FLEMMING. This famous Berlin ophthalmologist was widely known for his experiments on trachoma corpuscles and on the therapeutic action of radium and mesothorium. Born in 1874, the son of a preacher, he became a student in the Kaiser-Wilhelm Academy. Having received his medical degree, he soon was troop physician, later physician in chief to the "Plöner Cadet Institution." Promoted to the aerial service, he made a large number of experiments in aviation, and, in this way, was of great service to the German Government. He also thoroly studied the aerial bacteria, of which he named large numbers. From 1907-'11 he was assistant to Professor Greeff. He died of a wound in a field hospital, in his forty-fourth year.

CHARLES W. HADDOCK. A well known ophthalmologist of Beverly, Mass. Was born in Beverly, June 3, 1856, son of the late Dr. and Mrs. Charles H. Haddock. After a preliminary course of study at the Massachusetts College of Pharmacy, he attended the Harvard Medical School, where he graduated with the class of 1879. From 1880-'82 he studied at Heidelberg and Vienna, and, returning to America, practiced at Beverly with his father until the latter's death.

Then he studied the eye, ear, nose, and throat in Boston, Philadelphia, and New York; and, beginning with 1892, devoted himself for nineteen years exclusively to ophthalmology and otolaryngology at Salem and Beverly, Mass. In 1915 he retired from practice. He died Dec. 14, 1918, after a long period of ill health, survived by a widow and one son, Charles C. Had-

dock, who is in the Research Department of the Army at Washington.

**FREDERICK CARROLL HEATH.** A prominent ophthalmologist of Indianapolis, Ind., was born at Gardiner, Me., Jan. 19, 1857, son of Alvan M. C. and Sarah Hinckley Philbrook Heath. He received the A. B. at Amherst in 1878, the A. M. in 1886, and the M. D. at the Maine Medical College (Bowdoin) in 1884. Shortly afterward he studied the eye, ear, nose and throat, and settled in Indianapolis as a specialist on the diseases of these organs.

Dr. Heath was assistant surgeon in the U. S. Marine Hospital Service for six years, Secretary of the Indiana State Medical Society for fourteen years, eye surgeon to the Indianapolis City Hospital and Dispensary, to The German Lutheran Orphan Asylum, and The Eleanor Hospital; also professor of ophthalmology at the Indiana University Medical College from 1905 until his death.

Dr. Heath married, on June 19, 1895, Agnes Ralston Cochrane, of Indianapolis, by whom he had one daughter, Mary. The Doctor died on Oct. 16, 1918, survived by his widow and daughter.

**ISAAC H. LENT.** This Middletown, N. Y., ophthalmologist, of considerable local reputation, was born on a farm in the Mohawk Valley in 1846. He received in 1873 his degree in medicine at the Albany, N. Y., Medical College. For fifteen years he practiced general medicine at Valatie, N. Y., and then studied the eye, ear, nose and throat in New York and Philadelphia. Settling at Middletown, N. Y., he practiced there for the rest of his life. For a number of years he was consulting ophthalmologist to the Thrall Hospital, Middletown. His death occurred from spinal hemorrhage about Oct. 20, 1918.

**ROY RICHARD LONGINO.** This prominent Texas specialist on the eye, ear, nose and throat, born Dec. 17, 1888, son of Stephen Beasley and Edna Young Longino, received the medical degree at Tulane University, New Orleans, in 1911. On June 5, 1912, he married Ruth Bransford, by whom he

had one child, Mary Ruth. During the year 1913 he was assistant superintendent to the State Epileptic Asylum, Abilene, Texas. Later, he practiced as ophthalmologist and otolaryngologist at Ft. Stockton.

He was a man of impressive appearance, large, strong, somewhat stout, smoothfaced and fair complexioned. He was deliberate in manner, but full of quiet energy, and very devoted to his profession. He was an Elk, a Mason, a Methodist. A friend of the Doctor writes "Perhaps no man, for his age, was more respected and loved in any community. Especially the children and the old people will greatly miss him." He died at his home, Oct. 18, 1918, from influenza and its complications.

**JOSEPH WILLIAMS LOVIBOND,** author of numerous works on color and the inventor of the tintometer, was born in England in 1833 and died there April, 1918. He joined the rush of gold seekers to California in 1849 but soon returned to England and became manager of a brewery. He wrote books on "Light and Color Measurements," "Color Phenomenon," and "Color Theories," and many papers with regard to color. The tintometer, a color scale for comparison, has been widely used in the arts and for blood testing.

**CHARLES EMERY PAYNE.** An oculist and aurist of Brooklyn, N. Y. Born in Camden, Me., in 1882, he received the medical degree in 1903 at the New York Homeopathic Medical College. For fourteen years he practiced in Brooklyn. He was consulting laryngologist and rhinologist to the Jamaica and Cumberland St. Hospitals, attending physician to the Home for Consumptives, a member of the Advisory Board to the Peck Memorial Hospital, and laryngologist, rhinologist, and assistant oculist and aurist, to the Brooklyn Nursery and Infants' Hospital. He died at his home, on Nov. 18, 1918, from pneumonia.

**THOMAS TOUNGE PERKINS** was an eye, ear, nose and throat specialist of Cliftondale, Mass. Born in Auburn, Me., he later resided in West Durham, Me., and Lynn, Mass. He was a grad-

uate of the Massachusetts Institute of Technology, of the Boston University, and, in medicine, of the Harvard Medical School, in 1901. He seems to have settled, soon after his graduation in medicine, at Cliftondale, and to have practiced there continuously. In his later years he became an ophthalmologist and otolaryngologist, as well as an expert with the microscope. He was a Universalist, a Royal Arch Mason. He died Dec. 6, 1918, from heart disease.

GEORGE RUPP PRETZ, a well known ophthalmologist and otolaryngologist of Lebanon, Penna., was born at Steelton, Penna. He graduated at the Steelton High School, Gettysburg College, and, in 1909, at the Johns Hopkins University, Medical Department.

He settled, at first as general practitioner, in Lebanon; but later decided to limit his practice to the eye, ear, nose and throat. He was ophthalmologist and otolaryngologist to the Good Samaritan Hospital at Lebanon, and a Fellow of the A. M. A. He was also a prominent Mason, and an active worker in the Seventh Street Lutheran Church.

At the very beginning of America's entry into the war, he tendered his services to the War Department, was commissioned a lieutenant; and shortly afterward was called for duty at Camp Greenleaf. On Sept. 4, 1918, he wrote to a friend in Lebanon, "This is a great life. I'm in the best of health." On Sept. 20, however, he died, from pneumonia, the result of influenza.

MICHAEL PHILIP SCHUSTER was a prominent ophthalmologist and otolaryngologist of El Paso, Texas, and founder of the Providence Hospital in that city. Born in Gyor, Hungary, in 1860, he received his medical degree in 1889 at the University of Vienna, Austria. For the next three years he was chief assistant to Prof. Fuchs.

Coming to America, Dr. Schuster settled in Kansas City, where, for a time, he was chief surgeon to the American Smelting and Refining Co. He also taught for a number of years in the Kansas City College of Medicine.

Removing to El Paso, Texas, the Doctor remained chief surgeon to the American Smelting and Refining Co., a position which he held, all told, for eighteen years. In 1905 he was President of the El Paso County Medical Society. He was also a Fellow of the American College of Surgeons and a thirty-third degree Mason.

Dr. Schuster died at his home on Nov. 15, 1918, after a year or more of



Halstead Robert Wright, 1875-1918

illness. He was survived by two daughters, and by two sons—Dr. Stephen Schuster, commander of Base Hospital 129, Camp Shelby, Hattiesburg, Miss., and Dr. Frank P. Schuster, Medical Reserve Corps, Cook County Hospital, Chicago.

HOMER WARREN THOMPSON was an ophthalmologist and otolaryngologist of Salem, Ohio, well known locally. Born at Salem, Dec. 8, 1859, son of Joseph Warren and Hannah Ann Thompson, he received the medical de-

gree at Pulte Medical College, Cincinnati, in 1885. He married, on April 12, 1900, Miss Cora May Owen. He was a well known aeronaut. His death occurred from angina pectoris, Feb. 8, 1918.

**HALSTEAD ROBERT WRIGHT.** A young American ophthalmologist of great promise. Born at Coshocton, Ohio, May 20, 1875, he removed to Columbus with his father's family in 1880. He graduated in dentistry at the University of Ohio in 1895, but after a brief period of dental practice, took up the study of medicine in the same university, where he received the medical degree in 1910.

He then located for practice in Columbus, becoming a partner with his father. He was, from 1910 till 1917, instructor in physiology and pathology at his alma mater. He invented a number of ophthalmic instruments, and contributed to "The Ophthalmic Record" a number of ophthalmic articles, among which may be mentioned the following: "The Use of the Snare as the Final Step in the Enucleation of

the Eye"; "A New Method of Preparing an Eye for Microscopic Sections"; "A Rare Intraocular Tumor," and "A Rare Tubercular Condition of the Eye."

Dr. Wright was a large, robust man, smooth faced, of fair complexion, with dark brown eyes and hair. He was very serious in manner as a rule, but enjoyed an occasional joke. He was very fond of fishing. He was a Democrat, a believer in Christianity, but not a member of any church, a thirty-second degree Mason, and a Shriner. He became a captain in the Medical Service of the Army, and died at Camp Greenleaf, Georgia, Oct. 17, 1918, survived by his father, also by his wife and son.

**CHARLES O. ZAHNER.** An ophthalmologist and otolaryngologist of Louisville, Ky. Born in 1880, he received the medical degree in 1904 at the University of Louisville. He was also a graduate of the Louisville College of Pharmacy. He died of influenza at his home, on Oct. 11, 1918, survived by his widow, Blanche McCleary Zahner.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. Edward F. Parker, Charleston, S. C.; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City. Volunteers are needed in other localities.

### DEATHS.

Claude Huston Case, Kansas City, Kansas, aged 44, died from pneumonia following influenza, October 22nd.

George A. Cubbison, Erie, Pa., aged 55, died at his home, December 21st, from pneumonia following influenza.

N. C. Macnamara, of Hertfordshire, England, died November 21st, 1918, at the age of 86.

Mitchell Mikkelsen, Wells, Minn., aged 68, died at his home from pneumonia, January 8th.

Samuel L. Oren, Lieut., M. C., U. S. A., Lewistown, Illinois, aged 39, who after a course of training at Fort Oglethorpe, Geor-

gia, was sent overseas, died in France, October 9th, from nervous collapse presumably following ambulant typhoid fever.

Charles Henry Weintz, Captain, M. C., U. S. A., Cincinnati, aged 33, assistant chief of the nose and throat department of the base hospital, Camp Sherman, died at the Camp, October 14th, from pneumonia.

### PERSONAL.

Major Vard H. Hulén, sends Christmas greetings from Bordeaux, France.

A son of Dr. H. H. Burnham, of Toronto, Canada, was killed in action in France.

Dr. John F. Rowland of Hot Springs, Arkansas, has been elected president of the Garland County Hot Springs Medical Society.



Dr. Robert H. Miller announces the removal of his offices to 711 Los Angeles Investment Building, Broadway and Eighth streets, Los Angeles, California.

King George of England has recently appointed Sir George Anderson Critchett, Surgeon Oculist in Ordinary to His Majesty; and Richard Robert Cruise, Surgeon Oculist Extraordinary.

## MILITARY NOTES.

Captain Frank Brawley has been transferred from Mineola, L. I., to Millington, Tenn.

Captain C. P. Small has been assigned to duty at the government arsenal at Rock Island.

Captain J. W. Foley of Denver, Colorado, has been granted an honorable discharge from the army.

Captain F. C. Bakes of Albuquerque, New Mexico, has been granted an honorable discharge from the army.

Major George F. Suker has been transferred from Pittsburgh to the Walter Reed Hospital, Washington, D. C.

Captain G. T. Jordan has been transferred from Camp Grant to temporary duty in the Department Surgeon's office—Central Department, Chicago.

Major T. A. Woodruff has obtained his release from the service, and will reside at New London, Conn.

Dr. W. H. Roberts of Pasadena, who entered the service as a Captain, was recently promoted to the rank of Major, being stationed at Camp Lewis.

Dr. C. G. Stivers of Los Angeles, Captain in the Medical Reserve Corps, is in charge of Aviation examinations at San Francisco.

Major Burton Chance has been mustered out of service, and has resumed practice at 255 South 13th street, Philadelphia, Pennsylvania.

Captain F. L. Anderson, attached to Base Hospital, Camp Logan, has been honorably discharged and resumed his practice at Roswell, N. Mex.

Dr. George H. Kress of Los Angeles was Senior Surgeon in charge of the University of Southern California Students' Army Training Corps until the same was mustered out with the other S. A. T. C. organizations throughout the country.

Dr. William T. Shoemaker of Philadelphia has been appointed ophthalmologist to all the American hospitals in England. Dr. Shoemaker went to France in May, 1917, as ophthalmologist to the Pennsylvania Hospital unit. Two of his sons are in the service.

Major C. W. Kollock, who entered the Aviation Medical Service, U. S. A., has been discharged and is resuming his practice of ophthalmology and oto-laryngology, and his duties as Professor of Rhinology and Laryngology in the Medical College of South Carolina in Charleston, S. C.

On authority of the Office of the Surgeon General of the Army, it is said that there may be less than fifty American soldiers who suffered total blindness from wounds received in action. This is considered a remarkable record for the number of men engaged, and the intensity of the fighting in the sectors where Americans were engaged.

Sir C. Arthur Pearson, head of the British National Institute, which is devoted to the care of men who have lost their sight in the war, and himself blind, sailed for the United States and Canada, December 20th. The object of his visit is to confer with those responsible for the care of American soldiers blinded in the war and with Canadian authorities regarding the future welfare of Canadian soldiers trained at St. Dunstan's Hotel for Blinded Soldiers and Sailors, London.

When the war began Sir Arthur Pearson was president of the National Institute for the Blind in England. He organized the blind soldiers' and sailors' care committee and set about to find a suitable building where these men might be trained to be self-supporting. The selection was St. Dunstan's in Regent's park, London. Only sixteen men entered at first, but now there are close to 600 in training in the institution; 250 are in the hospital, and almost 700 trained men have left, some to take up their former work and others the new occupations they have mastered.

## SOCIETIES.

The twelfth semi-annual session of the Sioux Valley Eye and Ear Academy was held in Sioux City, Iowa, on January 21st.

At a recent meeting of the Minnesota Academy of Ophthalmology and Oto-Laryngology, the following officers were elected for the ensuing year: President, J. D. Lewis of Minneapolis; vice-president, E. R. Bray of St. Paul; 2nd vice-president, A. D. McConnell of Minot, N. D.; secretary-treasurer, John Morse of Minneapolis.

The annual meeting and dinner of the Chicago Ophthalmological Society took place on January 20th, about sixty members being present. The guest of the occasion was Dr. Francis Park Lewis of Buffalo, whose address, "The Specialist, His Relation to the Profession and to the Community" was particularly apt at this time, and was enthusiastically received. One suggestion offered by Dr. Lewis which seems worthy of most thoughtful consideration is that the work of the Examining Boards, in co-operation with the Advisory Boards, by which the Government has been able to give the most skillful medical attention to our soldiers, be continued in practically the same method of operation, under federal supervision, for the benefit of the general civilian population.

The following officers of the Society were elected for the ensuing year: President, William A. Noble; vice-president, A. L. Adams of Jacksonville; secretary-treasurer, Alfred Murray was re-elected; councilor, Douglas Payne.

## MISCELLANEOUS.

It has been calculated that the number of totally blinded victims of the war, among all the allied armies, is 7,000. Twenty-five or thirty per cent will probably have to be added to this figure from among the patients now undergoing treatment. The total of those who lost one eye amounts to between 30,000 and 40,000.

The quarterly report of the Illinois State Department of Public Welfare states that 2,000 blind adults are supported by county pensions in Illinois. Trachoma is declared to be the cause of the high rate of blindness in the southern part of the state.

In consequence of a world-wide shortage of spectacle lenses, frames and mountings, the War Service Committee of the Optical Industry, announces that the conservation policy adopted by the trade for the war will be continued during the reconstruction period.

As a result of the efforts made by the health authorities to eradicate trachoma from North Carolina, the State Board of Health has made this a reportable disease.

The fourth annual meeting of the National Committee for Prevention of Blindness was held in New York on November 26th. The speaker of the evening was Lieut.-Col. James Bordley who is directing the work for the blind in the Army and Navy, and is also director of the Red Cross Institute for the blind.

Mr. J. C. Gleason, who has been a music teacher in Chicago, but has been blind for twenty years, is lecturing in different parts of the country, assisted by local blind talent. He is acquainting people with the problems of re-education of the blind.

On the 22nd of November took place the ceremony of the first stone of the new Medical School of the University "Estrada Cabrera" of the Republic of Guatemala, on the same site where stood the old school that was destroyed by the earthquakes of the end of last year. The new buildings will be finished in 1921, first anniversary of independence.

The "Little Shop for the Permanent Blind Fund" in Chicago is meeting with most encouraging success. One needs to visit the shop to realize what beautiful pieces of work are being shown, most of which is the hand-work of young society women. Blanket covers made of voile and lace, boudoir and traveling caps, chiffon infant caps, negligees, wash-cloths and Red Cross dolls are among the articles that find ready purchasers. Everything in the shop is donated, and a number of the things are made by the wounded blind. A different committee of women are in the shop each day to take charge of the sales, the proceeds of which go to the permanent blind fund.

In the Red Cross institute for the blind offices are two blind girls, who four months ago answered an advertisement of the institute for

stenographers. After four months' training they are said to be the equal of any stenographer in the city. They are being paid at the regular piece rates, and their earnings amount to from \$18 to \$22 a week.

The Bureau of Standards of the National Department of Commerce has prepared a tentative draft of a National Code for Head and Eye Protection which is ready for inspection and criticism. It is intended to perfect this Code so that it will be suitable for general application by industrial commissions and others having legal powers, as well as by private plants and casualty insurance companies who may wish to use it as their own standard. The Bureau will be glad to have oculists examine this at their earliest convenience and submit criticisms and suggestions for improvement in the requirements or the wording to Division I, Section 8, of the Bureau.

Extensive preparations for the swift education of blind soldiers so that they may go into the labor market on equal terms with workers who have their sight, have been completed by the Red Cross Institute for the Blind, working in conjunction with the office of the surgeon general of the United States.

Some idea of the scope of the work already completed may be gathered from the fact that a complete survey of every industry in the country has been made with a view to its applicability to blind workers. It has been found that more than a quarter of all United States industries can use the blind workers.

The methods of training have already been worked out by having the best workers in each industry do their tasks before a moving picture camera. The film is then "reviewed" by experts from the Society of Mechanical Engineers, who have donated their services to the government. These men eliminate all the waste motion in the processes and design instruments which will help the blind workman and increase his efficiency.

Already plans have been drawn by a large Eastern syndicate for a chain of "Victory stores" to be placed in all locations chosen by blind soldiers who wish to go into business. The syndicate, under the jurisdiction of the Red Cross will do all the buying for the store-keepers.

The December *News Letter* published by the National Committee for the Prevention of Blindness is most interesting reading. Ophthalmologists who would like to receive it regularly need only to so notify the Committee at 130 East Twenty-second Street, New York City. This committee is doing a work which should be known and supported by every ophthalmologist in the country. Their report on "Classes for Conservation of Vision" shows a gradual extension of such classes throughout the schools of our larger cities. It is a most valuable work and the School Boards of larger cities should have their attention called to it and be urged to found such classes.

# OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

## DIAGNOSIS.

- Hudson, A. C.** Large Perimeter with Eccentric System of Registration. (1 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 213-216.
- Liebermann.** Simple Electric Lamp for Examination of Double Images and Reaction of Pupil. *Duet. med. Woc.*, 1917, No. 2. *Abst. Clin. Ophth.*, v. 22, p. 681.
- Standard Illumination of Snellen Test Types.** *Brit. Jour. Ophth.*, v. 3, p. 22.
- Vogt, A.** Cystic Degeneration of Macula Lutea as Shown by Red-free Light. (11 ill.) *Klin. M. f. Augenh.*, v. 61, pp. 379-392.

## THERAPEUTICS.

- Clotet.** Collyria in Ocular Therapeutics. *España Oft.*, v. 4, pp. 11-13.
- Dunn, P.** Thyroid Therapy in Ophthalmic Practice. *Brit. Jour. Ophth.*, v. 3, pp. 10-15.
- Frias Ornate, A.** Cocain in Ophthalmic Practice. *Rev. de Med. y Cirug. de la Habana*, Nov. 10, 1918.
- Garcia Mansilla, S.** Salvarsan in Ophthalmic Practice. *Rev. de Cien. Med. de Barcelona*, July, 1918.
- Marin Amat, M.** Substitute for Optochin. *Arch. de Oft. Hisp.-Amer.*, v. 18, pp. 517-534.
- Molinari, G.** Serums and Vaccines in Eye Affections. *Riforma Med.*, v. 34, p. 820. *Abst. Jour. A. M. A.*, v. 72, p. 77.
- Moore, C. H.** Procrastination in Care and Treatment of Eye. *Albany Med. Annals*, v. 40, pp. 1-10.

## OPERATIONS.

- Andrews, J. A.** Simple Electrical Device for Illuminating Field of Operation. (1 ill.) *Arch. of Ophth.*, v. 48, p. 65.
- Verhoeff, F. H.** Efficient Lamp for Eye Operations. *Amer. Jour. Ophth.*, v. 2, p. 53.

## REFRACTION.

- Ascher.** Influence of Source of Light on Primary Localization of Senile Cataract. *Med. Klin.*, 1917, pp. 527-529.
- Green, J. Jr., and Hardy, W. F.** Astigmatism against the Rule, Recognition and Frequency. *Arch. of Ophth.*, v. 48, pp. 45-55.

**Observations on Astigmatism.** *Amer. Jour. Ophth.*, v. 2, p. 47.

**Isakowitz, G.** Refraction and the Work of the Painter. *Klin. M. f. Augenh.*, v. 61, pp. 454-455.

**Jackson, E.** Common Changes in Regular Astigma, Causes. *Amer. Jour. Ophth.*, v. 2, p. 21.

**Louis.** Changes of Refraction in Relation to Occupation. *Heidelberg Diss.*, 1918. *Abst. Klin. M. f. Augenh.*, v. 61, p. 470.

**Mügge, F.** Anomalies of Refraction and the Faculty of Vision. *Klin. M. f. Augenh.*, v. 61, pp. 423-432.

**Payne, S. M.** Hypermetropia Responsible for Heterophoria, Astigmatism and Myopia. *Amer. Jour. Ophth.*, v. 2, p. 30.

**Pavia, J. L.** Dynamic Retinoscopy. *Semana Med.*, v. 25, p. 2184.

**Roy, J. N.** Eyesight of Negroes of Africa. *Arch. of Ophth.*, v. 48, pp. 72-83.

**Silberstein, L.** Simplified Method of Tracing Rays through any Optical System. 37 pp. London: Longmans-Green and Co., 1918. *Abst. Lancet*, Dec. 14, 1918, p. 820.

**Williams, E. R.** Treatment of Asthenopia in Children. *Amer. Jour. Ophth.*, v. 2, p. 39.

## OCULAR MOVEMENTS.

**Duane, A.** Basic Principles of Diagnosis in Motor Anomalies of Eyes. *Arch. of Ophth.*, v. 48, pp. 1-18.

**Kleijn, A de and Tumbelaka.** Vestibular Eye Reflexes. *Graefe's Archiv. f. Ophth.*, v. 95, p. 314.

**Magath, F. B.** Variation in Distribution of Abducens Nerve in Man. (2 ill., Bibl.) *Arch. of Ophth.*, v. 48, p. 67-71.

**Marquez.** Operation in Extreme Convergent Strabismus. *España Oft.*, v. 4, p. 17.

**Ohm, J.** Vestibular Strabismus. *Zeit. f. Augenh.*, v. 39, p. 204.

**Schoenberg, M. J.** Paralysis of Associated Movements. *Arch. of Ophth.*, v. 48, p. 86.

**Sheard, C., and Ferree, J. A.** Ocular Movements and Center of Ocular Rotation. *Jour. Amer. Inst. Homeop.*, v. 11, pp. 771-782.

**Taylor, J.** Paralysis of Ocular Muscles. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 168-169.

**Teal, F. F.** Nuclear Paralysis. *Nebraska Med. Jour.*, v. 3, p. 276.

#### CONJUNCTIVA.

- Axenfeld, T.** Gonorrhea, Blennorrhea and Trachoma. *Duet. med. Woch.*, v. 53, p. 160.
- Brinton, A. G.** Vernal Catarrh. *Med. Jour. South Africa*, v. 13, pp. 142-144.
- Cohen, M.** Striated Keratitis. *Arch. of Ophth.*, v. 48, p. 96.
- Tuberculosis of Conjunctiva.** *Arch. of Ophth.*, v. 48, p. 96.
- Collins, E. T.** Natural History of Trachoma. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 46-52.
- Crigler, L. W.** Trachoma with Corneal Involvement Relieved by Heisrath-Kuhnt Operation. *Arch. of Ophth.*, v. 48, pp. 93-95.
- Cunningham, J. F., and Wharton, J.** Contagious Disease of Conjunctiva in War. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 18-30.
- Derby, G. S.** Trachoma and Immigration. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 66.
- Eason, H. L.** Military Ophthalmia in Egypt. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 30-46.
- Elliot, R. H.** Treatment of Trachoma. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 38-64.
- Feigenbaum.** Eye Diseases in Palestine, Especially Koch-Weeks Conjunctivitis, with Corneal Complications. *Wien. klin. Woch.*, 1917, p. 63.
- Giri, D. V.** Treatment of Ophthalmia Neoratorum with Protosil. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 67.
- Haab, O.** Vaccine Treatment of Gonorrheal Ophthalmia. *Munch. med. Woch.*, v. 65, No. 24. *Abst. Klin. M. f. Augenh.*, v. 61, p. 472.
- Hepburn, M. L.** Papilloma of Conjunctiva. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 124.
- Hine, M. L.** Chronic Conjunctivitis or Trachoma in Army among Chinese. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 53.
- Lewis, J. C., and Seddon, H. R.** Habronemic Conjunctivitis. *Jour. Comp. Path. and Therap.*, v. 31, pp. 87-94.
- Lister, W. T.** Trachoma Problem in France. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 52.
- Lundsgaard, K. K.** Treatment of Tuberculous Conjunctiva with Light. (5 ill., Bibl.) *Klin. M. f. Augenh.*, v. 61, pp. 369-379.
- McCaigan, A. F.** Traveling Hospitals for Treatment of Trachoma in Army. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 54.
- Mayou, M. S.** Histology of Lymphoid Tissue in Conjunctiva. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 61-63.
- Nussbaum.** Quick Healing of Gonorrheal Ophthalmia after Injection of Sterilized Milk. *Klin. M. f. Augenh.*, v. 61, p. 472.
- Parrot, L.** Rarity of Phlyctenular Conjunctivitis in Algeria. *Bull. Soc. Path.*, v. 11, p. 578.
- Santos-Fernandez, J.** Can Trachoma be Cured? *Cron. Med.-Quir. de la Habana*, v. 44, p. 343. *Abst. Jour. A. M. A.*, v. 72, p. 79.
- Siegheim.** Diphtheritic Diseases of Eye. *Heidelberg Diss.*, 1917. *Abst. Klin. M. f. Augenh.*, v. 61, p. 475.
- Smith, E. T.** Tarsectomy for Trachoma. *Med. Jour. Australia*, Nov., 1918, p. 460.
- Stephenson, S.** Development of Ophthalmia School. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 11-18.
- Story, J. B.** Contagious Diseases of Conjunctiva. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 9, and p. 68.
- Jequiritol in Trachoma.** *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 63.
- Thost.** Pemphigus of Mucous Membrane. *Abst. Klin. M. f. Augenh.*, v. 61, p. 475.
- Ticho, A.** Eye Affections in Palestine. *Wien. med. Woch.*, v. 30, p. 1059.
- Tyrrell, F. A. C.** Ophthalmia Schools. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 59.
- Zlocisti, T.** Dysentery Conjunctivitis. *Klin. M. f. Augenh.*, v. 61, pp. 393-401.

#### CORNEA AND SCLERA.

- Alvarez-Revero, C. U.** Treatment of Serpigenous Ulcer of Cornea with Ethylhydrocuprein. *España Oft.*, v. 4, p. 7-10.
- Bell, G. H.** Nodular Keratitis. *Arch. of Ophth.*, v. 48, p. 92.
- Cridland, A. B.** Treatment of Serpent Ulcer of Cornea. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 363.
- Giri, D. V.** Opacity of Corneas of Unknown Origin. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 147.
- Habermann.** Improvement of Scrofulous Keratitis after Gonococcus Vaccination. *Duet. med. Woch.*, v. 43, p. 287.
- Knapp, A.** Intraocular Disease with Anterior Scleral Ectasia. *Arch. of Ophth.*, v. 48, p. 97-98.
- Mayou, M. S.** Corneal Degeneration. (2 ill. 1 pl.) *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 148.
- Ourgaud.** Treatment of Hypopyon Keratitis. *Clin. Ophth.*, v. 22, pp. 651-657.
- Salmon, W. T.** Keratoconus. *Jour. Okla. State Med. Assn.*, v. 12, pp. 1-13.
- Spicer, W. T. H.** Formation of Clear Spaces in Corneal Nebulae. (22 ill.) *Brit. Jour. Ophth.*, v. 3, pp. 1-8.
- Urraca, C.** Optochin in Serpent Ulcer. *Med. Ibera*, Oct. 5th, 1918.
- Willetts, J. E.** Corneal Corpuscular Activity. *Penn. Med. Jour.*, v. 22, pp. 196-198.

#### ANTERIOR CHAMBER AND PUPIL.

- Mayou, M. S.** Congenital Anterior Synechiae With Buphthalmus and Pupillary Membrane. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 146.
- Reeves, P.** Pupillary Dilatation and Contraction. *Psychol. Rev.*, 1918, pp. 330-340.



### UVEAL TRACT.

- Bell, G. H.** Iridocyclitis due to Dental Infection. *Arch. of Ophth.* v. 48, p. 85.
- Frenzel, M.** Radiating Fissure of Iris Stroma with Intact Pigment Epithelium. *Berlin Diss.*
- Fuchs, E.** Organic Muscle Fibres in Choroid. *Graefe's Arch. f. Ophth.* v. 95, p. 311.
- Ichikawa, K.** Spindle-like Formations in Inflamed Uveal Tissue. (1 col. pl.) *Amer. Jour. Ophth.* v. 2, p. 1.
- James, J. H.** Iritis. *Minnesota Med. Jan.* 1919.
- Pacheco Luna, R.** Acute Iritis treated with Injections of Chlorhydrat of Emetin. *Arch. de Oft. Hisp. Amer.* v. 18, pp. 547-549.
- Pichler, A.** Total Extirpation of Iris. *Zeit. f. ophth. Opt.* 1918, p. 73. *Abst. Klin. M. f. Augenh.* v. 61, p. 486.
- Risley, S. D.** Diseases of Uveal Tract. *Penn. Med. Jour.* v. 22, pp. 189-196. *Amer. Jour. Ophth.* v. 2, pp. 104-112.
- Rovinsky, A.** Focal Infection of Eye from Intestinal Tract. *Jour. A. M. A.* v. 72, p. 138.
- Thompson, G. W.** Herpes Zoster Affecting Ciliary Nerves. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 152-158.
- Repeated Titles. **Coriat and Boulat.** (v. 1, p. 703.) *Brit. Jour. Ophth.* v. 3, p. 29.

### SYMPATHETIC DISEASE.

- Schieck.** Sympathetic Ophthalmia after Preventive Enucleation. *Graefe's Arch. f. Ophth.* v. 95, p. 322. *Abst. Klin. M. f. Augenh.* v. 61, p. 487.
- Szily, A. v.** Metastatic Ophthalmia Following War Wounds. *Atlas Kriegsaugeheilkunde*, Stuttgart, 1917. *Abst. Brit. Jour. Ophth.* v. 3, p. 28.

### GLAUCOMA.

- Butler, T. H.** Statistics of Glaucoma Operations. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 368.
- Doesschate, G. Ten.** Relation of Eye Tension to Exophthalmos and Curve of Cornea. (1 ill. Bibl.) *Klin. M. f. Augenh.* v. 61, pp. 411-423.
- McLean, W.** Intraocular Pressure and Tonometry. (3 ill.) *Arch. of Ophth.* v. 48, pp. 23-37.
- Mayou, M. S.** Congenital Anterior Synchiae with Buphthalmos and Pupillary Membrane. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 146.

### CRYSTALLINE LENS.

- Cridland, A. B.** Hereditary Cortical Cataract with Pedigree of Family. *Tr. Ophth. Soc. Ophth. United Kingdom*, v. 38, p. 374.
- Berger.** Is Cataract Always Coincident with Diseases of the Nervous System? *Abst. Klin. M. f. Augenh.* v. 61, p. 482.
- Brownell, M. E.** Cataract Delirium. *Tr. Clin. Soc. Univ. Mich.* v. 8, pp. 74-78.

- Kearney, J. A.** Cystotome Extraction of Lenses Within the Capsule. *Arch. of Ophth.* v. 48, pp. 62-64.
- Kinnier Wilson, S. A.** Myotonia Atrophica with Family Cataract. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 184.
- Lambert, W. E.** Congenital Dislocation of Lenses. *Arch. of Ophth.* v. 48, p. 84.
- Nawrottek.** Artificial Ripening of Immature Cataract. *Inaug. Diss. Abst. Klin. M. f. Augenh.* v. 61, p. 495.

### VITREOUS.

- Stieren, E.** Spontaneous Hemorrhage into Vitreous. *Penn. Med. Jour.* v. 22, p. 187.
- Wheeler, J. M.** Persistent Hyaloid Artery. *Arch. of Ophth.* v. 48, p. 87.

### RETINA.

- Abelsdorff.** Acute Retrobulbar Optic Neuritis and Myelitis. *Abst. Klin. M. f. Augenh.* v. 61, p. 480.
- Ballaban.** Rupture of Retina with Choroidal Sarcoma. *Graefe's Arch. f. Ophth.* v. 95, p. 318.
- Barrett, W. F.** Entoptic Vision and a New Entoptiscope. *Tr. Ophth. Soc. United Kingdom* v. 38, p. 349.
- Downey, J. W.** Minimum Light Sense and Retinal Dark Adaptation: New type of Photometer. *Amer. Jour. Ophth.* v. 2, p. 13.
- Gaehr, P. F.** Purkinje Effect and Persistence of Vision. *Science*, v. 48, p. 575.
- Goldmann.** Hemeralopia with Accompanying Cerebral Symptoms. *Wien. klin. Woch.* v. 43, p. 1127.
- Haggeny.** Retinal Detachment in High Myopia with Rise of Tension. *Heidelberg Diss. Abst. Klin. M. f. Augenh.* v. 61, p. 480.
- Hillemanns, M.** Examination of Light Sense for Military Purposes. *Klin. M. f. Augenh.* v. 61, pp. 456-460.
- Schoenberg, M. J.** Acute Retrobulbar Neuritis in Child with Intestinal Stasis. *Arch. of Ophth.* v. 48, p. 56-61.
- Spalding, J. A.** Rare Scintillating Scotomata; Self Observed. *Arch. of Ophth.* v. 48, pp. 38-42.
- Strebel, J.** Clinical Demonstration of Nerve Fibres in Retina. *Corresp. Bl. f. Schweizer Aerzte*, v. 48, p. 1442.
- Uribe-Troncoso, M.** Tubercular Endovascularitis of Retinal Vessels with Degeneration of Optic Nerve and Retina. *Arch. of Ophth.* v. 48, pp. 89-92.

### TOXIC AMBLYOPIAS.

- Elliot, R. H.** Unusual Idiosyncrasy to Quinin. (1 ill.) *Brit. Jour. Ophth.* v. 3, pp. 8-10.
- Ginsberg.** Transient Amaurosis Appearing after Use of Optochin. *Duet. med. Woch.* v. 43, p. 590.
- Nagel, C. S. G.** Quinin Amblyopia from Rectal Administration. *Amer. Jour. Ophth.* v. 2, p. 54.

**Ujile, M.** Amaurosis from Ethylhydrocuprein. *Corresp.-Bl. f. Schweizer. Aerzte*, v. 48, p. 1556. *Abst. Jour. A. M. A.*, v. 72, p. 157.

#### OPTIC NERVE.

**Fejer, J.** Pigmentation, Medullated Nerve Fibres of Optic Nerve Head. (2 ill. Bibl.) *Klin. M. f. Augenh.* v. 61, pp. 448-454.  
**McNab, H. H.** Intracranial Sarcoma with Early Symptoms of Acute Retrobulbar Neuritis. *Brit. Jour. Ophth.* v. 3, p. 16.  
**Paton, L.** Papilledema in Cerebral Tumor. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 170-172.  
**Vossius.** Family Optic Atrophy. *Med. Klin.* 1917, p. 850.  
**Weill, P.** Bilateral Excavation of Optic Papilla with Full Vision. *Munch. Diss.*

#### VISUAL TRACTS AND CENTERS.

**Camp, C. D.** Hysteric Blindness. *Tr. Clin. Soc. Univ. Mich.* v. 8, p. 135.  
**Clegg, J. G.** Homonymous Lateral Hemianopsia. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 182.  
 Monocular Traumatic Altitudinal Hemianopsia. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 179.  
**Cords.** Rare Injuries to Nerves thru Shot Wounds. *Zeit. f. Augenh.* v. 39, p. 207. *Abst. Klin. M. f. Augenh.* v. 61, p. 490.  
**Gartin, S.** Sense of Orientation in the Atmosphere. *Zeit. f. Augenh.* v. 39, p. 368.  
**Hurst, A. F. and Symms, L. M.** Narrow and Spiral Fields of Vision in Hysteria, Malingering, and Neurasthenia. (5 ill.) *Brit. Jour. Ophth.* v. 3, pp. 17-21.  
**Mayou, M. S.** Sympathetic Paralysis Associated with Cervical Rib. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 178.  
**Saenger, A.** Changes in Visual Centers thru War Wounds. *Duet. med. Woch.*, v. 59, pp. 192-230.  
**Salus, R.** Symmetric Scotoma in Uremic Amaurosis. *Duet. med. Woch.*, v. 43, p. 1183.  
**Sarnowski, V.** Visual Troubles Following Injury to Brain. *Breslau Thesis. Abst. Clin. Ophth.* v. 22, pp. 683-684.  
**Terrien, F.** Ocular Symptoms with Skull Wounds. *Paris Med.* v. 8, p. 277. *Abst. Jour. A. M. A.*, v. 72, p. 75.

#### EYEBALL.

**Sinclair, W.** Cryptophthalmos. (1 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 142.

#### LACRIMAL APPARATUS.

**Archibald, R. G.** Primary Nocardiasis of Lacrimal Gland. *Lancet*, Dec. 21, 1918, p. 847. *Amer. J. Ophth.*, v. 2, p. 57.  
**Baldwin, F. B., Jr.** Supraorbital Zona. *Brit. Med. Jour. Nov.* 16, 1918, p. 543.  
**Detzel, L.** Atrophy of Parotid, Lacrimal, and Submaxillary Glands. *Freiburg Diss.*  
**Donelan, J.** Lacrimal Stenosis successfully treated by Dacryocystotomy. *Proc. Roy.*

*Soc. Med. Sec. on Laryngol.* 1917-18, p. 120.

**Handman.** Sounding and Stripping of Lacrimal Duct. *Duet. med. Woch.* 1918, No. 27, p. 748. *Abst. Klin. M. f. Augenh.* v. 61, p. 473.

**Jacobsohn.** Abscess of Tear Sac. *Heidelberg Diss. Abst. Klin. M. f. Augenh.* v. 61, p. 474.

**Landolt, E.** Affections of Lacrimal Duct. *Arch. de Oft. Hisp.-Amer.* v. 18, p. 544.

**Sabater, V. E.** Extirpation of Lacrimal Gland. *España Oft.* v. 4, pp. 2-7.

**Seidel.** Local Anesthesia in Treatment of Phlegmon of Tear Sac. *Graefe's Arch. f. Ophth.* v. 95, p. 320.

**Zais.** Tear Duct Operation. *Inaug. Diss.* 1917. *Abst. Klin. M. f. Augenh.* v. 61, p. 495.

#### LIDS.

**Butler, T. H.** Skin Grafting in Facial Wounds. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 107-112.

**Clegg, J. G.** Plastic Operation on Lids. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 115.

**Cruise, R. R.** Plastic Operations on Lids. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 114.

**Dunn, J.** Surgery of Meibomian Cysts. (1 pl.) *Arch. of Ophth.* v. 48, pp. 43-44.

**Gillies, H. D.** Plastic Operations on Eyelids. (27 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 70-100.

**Gonne, W. S.** Case of Balance Ptosis. *Tr. Clin. Soc. Univ. Michigan.* 1916-17, v. 8, pp. 78-80.

**Higgins, C.** Operations on Eyelids. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 100-102.

**Lowenstein.** Tongue-shaped Flaps with Kunht's Conjunctival Plastic Operation. *Zeit. f. Augenh.* v. 39, p. 190. *Abst. Survey of Head Surgery*, v. 1, p. 251.

**Mayou, M. S.** Operations on Eyelids. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 114.

**Ormond, A. W.** Plastic Operation on Eyelids. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 112.

**Soria y Escudero.** Blepharoplasty after Snyderker. *España Oft.* v. 4, p. 21. *Abst. Jour. A. M. A.*, v. 72, p. 231.

**Wood, D.** Masks for Facial Wounds. (2 ill.) *Tr. Ophth. Soc. United King.*, v. 38, pp. 102-106.

#### ORBIT.

**Bell, G. H.** Traumatic Pulsating Exophthalmos. *Arch. of Ophth.* v. 48, p. 84.

**Henderson, T.** Suture Operation for Contracted Socket. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 119-124.

**Hippel, v.** Intermittent Exophthalmos. *Graefe's Arch. f. Ophth.* v. 95, p. 307.

**Kausch.** Plastic Operations on Orbit. *Med. Klin.* 1918, No. 28, p. 702. *Abst. Klin. M. f. Augenh.* v. 61, p. 494.

- Olivier. Electric Treatment of Exophthalmic Goiter. *Paris Med.* v. 8, p. 275. *Abst. Jour. A. M. A.*, v. 71, p. 2181.
- Schl  pfer, K. Plastic Operation in Defects of Bony Orbital Wall. *Med. Klin.* v. 8, pp. 988-991.

## PARASITES.

- Kahn, W. Plant Foreign Body in Eye of Dog. *Heidelberg Diss.*
- Sattler. *Cysticercus Subretinalis.* *Deut. med. Woch.* v. 43, p. 93.
- Ticho, A. Ophthalmomyiasis. *Wien. klin. Woch.* 1917, No. 30, p. 286.

## TUMORS.

- Axenfeld, T. Temporo-Orbital Dermoid. *Duet. med. Woch.* 1917, v. 43, p. 1182.
- Ballaban. Choroidal Sarcoma. *Graefe's Arch. f. Ophth.* v. 95, p. 318.
- Carreras, B. Ocular Complications in Sarcoma of Temporal Fossa. *Espan  a Oft.* v. 4, pp. 13-17.
- Cohen, M. Primary Intradural Tumor of Optic Nerve. (2 pl.) *Arch. of Ophth.* v. 48, pp. 19-22.
- Collins, E. T. Bilateral Multiple Angiomata of Retina. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 165-167.
- Epibulbar Sarcoma of Conjunctiva Cured by Removal and Radium. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 125-129.
- Ebert. Lymphosarcoma with Metastases in Right Tear Sac and Left Orbit. *Inaug. Diss. Abst. Klin. M. f. Augenh.*, v. 61, p. 485.
- French, J. G. Orbital Tumor. *Proc. Roy. Soc. Med. Sec. on Laryngol.* 1917-18, p. 115.
- Hosford, S. Peripapillary Swelling (?) Angioma. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 158-160.
- Ring Sarcoma of Optic Papilla. (1 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 160-164.
- Inglissis, M. Dermoid of Eye Complicated by other Anomalies. *M  nch. Diss.*
- Krener, A. Melanosarcoma of Lid Conjunctiva. *M  nch. Diss.*
- Nelissen, A. A. M. Gumma of Orbit. *Nederl. Tijdschr. v. Geneesk.* 1918, ii, p. 1183. *Abst. Jour. A. M. A.*, v. 72, p. 81.
- Pereyra, G. Cure of Malignant Epibulbar Neoplasm. *Sperimentale*, 1918, pp. 93-118.
- Stark, H. H. Congenital Tumor of Cornea. (4 ill.) *Amer. Jour. Ophth.*, v. 2, pp. 5-13.
- Traquair, H. M. Hereditary Glioma of Retina. *Brit. Jour. Ophth.*, v. 3, p. 21.

## INJURIES.

- Anderson, W. A. Result of Explosion Injury to Eye. *Brit. Jour. Ophth.*, v. 3, pp. 15-16.
- Collins, W. Ophthalmology and the War. (Doyle Lecture), *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 292-324.
- Freytag, G. T. Pen Wound of Eye. *Deut. med. Woch.* 1917, v. 43, p. 881.

- Grosz, E. v. Ophthalmology in War. *Wien. klin. Woch.*, 1917, v. 30, p. 1092.
- Hacker. Operative Relief of Epiphora of Traumatic Origin. *Wien klin. Woch.*, 1917, v. 30, p. 1056.
- Haigh, G. W. Injury to Eye from Eyelash. *Jour. Amer. Med. Assn.*, v. 72, p. 275.
- Herrenschwand. Injury to Cornea from Cold in High Mountains. *Wien. klin.* 1918, No. 16, p. 456. *Abst. Klin. M. f. Augenh.*, v. 61, p. 492.
- McGrigor, D. B. Simple Methods of Localizing Foreign Bodies. *Arch. of Radiol. and Electrotherap.*, Nov., 1918, pp. 188-190.
- Mayou, M. S. Ring Infiltration of Cornea Following "Mustard Gas." *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 149.
- Meisel. Penetrating Wound of Lens with Recurring Inflammation. *Inaug. Diss. Heidelberg.* *Abst. Klin. M. f. Augenh.*, v. 61, p. 489.
- Milch, A. Recognition of Rupture of Eyeball. *M  nch. Diss.*
- Pirie, A. H. Localization of Foreign Body in Eye. *Arch. of Radiol. and Electrotherap.* Nov. 1918, p. 169.
- Price, G. H. Injuries to Eyes of Railway Employes. *Prevention and Treatment.* *Southern Med. Jour.*, v. 11, pp. 799-809.
- Salzmann, M. Shrapnel Wounds of Eye. *Wien. klin. Woch.*, 1917, v. 30, p. 1055.
- Ticho, A. Foreign Body in Clear Lens. *Wien. klin. Woch.*, 1918, p. 868.
- Tournay, A. Unequal Pupils after War Injuries. *Bull. de la Acad. de Med.*, v. 80, p. 486.
- Zehner, O. C. Orbital Wounds with Fatal Ending. *Heidelberg Diss.*

## PATHOLOGY.

- Carreras, B. Senile Changes in Choroid and Retina. *Espan  a Oft.*, v. 4, pp. 17-21.
- Gr  ff. Histologic Experimental Methods in Eye. *Duet. med. Woch.*, 1917, v. 43, p. 896.

## GENERAL DISEASES.

- Adam. Artificial Miscarriage and Artificial Sterility from Standpoint of Ophthalmology. *Abst. Klin. M. f. Augenh.*, v. 61, p. 485.
- B  r, C. Eye Disease Associated with Phthisis. *Klin. M. f. Augenh.*, v. 61, pp. 402-411.
- Batten, F. E. "Epidemic Stupor" with Ophthalmoplegia. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 172-178.
- Bulson, A. E. Jr. Syphilis as it Pertains to Eye. *Jour. Ind. State Med. Assoc.*, v. 11, pp. 438-442.
- Buzzard, E. F. Lethargic Encephalitis (Ocular Complications). *Lancet*, Dec. 21, 1918, pp. 835-837.
- Dor, L. Ocular Troubles of Dental Origin. *Clin. Opt.*, v. 22, p. 657.
- Elliot, R. H. Herpes Zoster Ophthalmicus. *Tr. Ophth. Soc. United Kingdom*, v. 38, p. 351.
- Guiral, R. Influenza and Ophthalmology. *Rev. de Med. y Cir.*, v. 23, p. 557. *Abst. Jour. A. M. A.*, v. 72, p. 80.

- Hall, G. W. Poliomyelitis of Bulbo-spinal Type with Unusual Eye Symptoms. *Jour. Nerv. and Ment. Dis.*, v. 48, pp. 445-447.
- James, S. P. Lethargic Encephalitis. (1 ill.) *Lancet*, Dec. 21, 1918, p. 837.
- Loeper, M. Flatulent Dyspepsia with Exophthalmic Goiter. *Progrès Méd.*, v. 33, 1918, p. 345. *Abst. Jour. A. M. A.*, v. 71, p. 2182.
- McFarling, A. C. Eye Strain a Factor in Gastric Neuroses. *Jour. Oklahoma State Med. Assn.*, v. 12, pp. 13-17.
- Rott, O. M. Etiologic Relation Between Eyestrain and Certain Reflex Conditions. *Med. Rev. of Rev.*, v. 25, p. 23-28.
- Simpson, J. H. Observations on Ocular Syphilis. *Urol. and Cutaneous Rev.*, 1918, v. 22, pp. 387-390.
- Stieren, E. Ocular Lesions of Influenza. *Amer. Jour. Ophth.*, v. 2, p. 55.
- Tibor, A. Paralysis of Cervical Sympathetic in Multiple Sclerosis. *Zent. f. Neurol.*, 1918, p. 575.
- Traummann, H. Erysipelas of Eye. *Heidelberg Diss.*
- COMPARATIVE OPHTHALMOLOGY.**
- Cajal, S. R. Structure of Visual Organs of Certain Insects. *Siglo Med.*, v. 65, p. 753. *Short Abst. Jour. Amer. Med. Assn.*, v. 72, p. 154.
- HYGIENE.**
- Bates, W. H. Improving Sight of Soldiers and Sailors and Relieving Pain. *New York Med. Jour.*, Oct. 12, 1918.
- Carhart, W. M. Care of Eyes of School Children. *Dept. of Health, City of New York*, v. 8, pp. 252-255.
- Cruise, R. R. Further Note on Protective Visor. (2 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 250-254.
- Fergus, F. Vision and Work. Results Obtained at Recruiting Office. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 260-279.
- Green, J. Jr. Special Classes for Children with Defective Sight. *Jour. Missouri State Med. Assn.*, Jan., 1918, pp. 12-16.
- McPherson, G. Use of Glare Glasses. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 282-284.
- Moulton, M. Conservation of Vision. *Jour. Arkansas Med. Soc.*, v. 15, pp. 126-128.
- Scott, L. M. How May We Better Conserve Vision? *Tenn. State Med. Assn.*, v. 11, p. 235.
- OPHTHALMIC SOCIOLOGY AND HISTORY.**
- Clarke, E. Eyesight and the War. *Proc. Roy. Inst. of Great Britain*, v. 21, pp. 688-701.
- Collins, E. T. Presidential Address. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 1-9.
- Color Blindness Not Loss of Sight. (Medico-Legal.) *Jour. A. M. A.*, v. 72, p. 303.
- Crisp, W. H. Should General Practitioners Refer Patients to Opticians. *Colorado Med.*, v. 16, pp. 16-20.
- Elschnig. Must There Be Blind People? *Klin. M. f. Augenh.*, v. 61, p. 496. Help for Visually Weakened Soldiers. *Klin. M. f. Augenh.*, v. 61, p. 496.
- Haab, O. Progress in Ophthalmology. *Correspbl. f. Schweizer Aerzte*, v. 48, p. 1457. *Abst. Jour. A. M. A.*, v. 71, p. 2112.
- Herwerden, M. A. v. Friendship of Donders and von Graefe. *Janus*, May-June, 1918, pp. 81-94.
- Jackson, E. The Ophthalmic Year Book. *Amer. Jour. Ophth.*, v. 1, p. 868.
- Loeb, C. Colleagues Returning to Civil Practice. *Amer. Jour. Ophth.*, v. 1, p. 868. Negligence in Treating Eyes of Child. (Medico-Legal.) *Jour. A. M. A.*, v. 72, p. 217.
- Rukop, E. Clinical and Pathologic Ophthalmic Anatomic Data Gathered in War. *Klin. M. f. Augenh.*, v. 61, pp. 433-438.
- Schweinitz, G. E. de. Organization and Development of School of Ophthalmology. *Amer. Jour. Ophth.*, v. 1, pp. 817-822.
- Stephenson, S. Opening Address at Oxford Congress. July 11th, 1918. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 289-292.
- Traquair, H. M., and Paterson, J. V. Standards of Vision in British Army. *Tr. Ophth. Soc. United Kingdom*, v. 38, pp. 130-141.
- Tyrrell, F. A. C. Frederick Tyrrell. (1 ill.) *Brit. Jour. Ophth.*, v. 2, pp. 593-596.
- Victorian Eye and Ear Hospital in Australia. *Med. Jour. Australia*, Nov. 23, 1918, p. 443.
- Wood, C. A. Reconstruction and Reeducation of Disabled Soldiers and Sailors. *Amer. Jour. Ophth.*, v. 2, pp. 47-52.